

BOOK OF ABSTRACTS



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YOUNG RESEARCHERS MEETING



U. PORTO



TÍTULO | *TITLE*

Livro de Resumos do 17.º Encontro de Investigação Jovem da U.Porto / *Book of Abstracts
Young Researchers Meeting of U.Porto*

Universidade do Porto

Vice-Reitor para a investigação e Inovação

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ENCONTRO INVESTIGAÇÃO JOVEM

8, 9 e 10 MAIO 2024

FACULDADE
DE ECONOMIA
UNIVERSIDADE
DO PORTO



PROGRAMA PROGRAM

	8 TH MAY	9 TH MAY	10 TH MAY
08:00 > 18:30	OPENING OF THE SECRETARIAT FOR ALL PARTICIPANTS		
09:00 > 10:30	PARALLEL ORAL SESSIONS I A1 - Architecture I A2 - History of Art, Heritage, and Cultural Studies I A3 - Chemistry I A4 - Health Sciences I A5 - Sport Sciences I	PARALLEL ORAL SESSIONS V A1 - Astronomy A2 - Psychology and Educational Sciences I A3 - Arts I A4 - Health Sciences V A5 - Sport Sciences III	PARALLEL ORAL SESSIONS IX A1 - Biological Sciences III A2 - Geography, Philosophy and Sociology A3 - Language Sciences A4 - Health Sciences IX
10:30 > 11:30	POSTER VIEWING & COFFE BREAK		
11:30 > 13:00	PARALLEL ORAL SESSIONS II A1 - Architecture II A2 - AgroFood A3 - Chemistry II A4 - Health Sciences II A5 - Sport Sciences II	PARALLEL ORAL SESSIONS VI A1 - Maths & Astronomy A2 - Psychology and Educational Sciences II A3 - Arts II A4 - Health Sciences VI A5 - Sport Sciences IV	PARALLEL ORAL SESSIONS X A1 - Biological Sciences IV A2 - Engineering I A3 - Literatures and Cultures A4 - Health Sciences X
13:00 > 14:30	LUNCH BREAK		
14:30 > 16:00	PARALLEL ORAL SESSIONS III A1 - Environment I A2 - Economics and Management I A3 - Chemistry III A4 - Health Sciences III A5 - Criminology and Law I	PARALLEL ORAL SESSIONS VII A1 - Biological Sciences I A2 - Psychology and Educational Sciences III A3 - Arts III A4 - Health Sciences VII A5 - Physics	PARALLEL ORAL SESSIONS XI A1 - Biological Sciences V A2 - Engineering II A3 - History A4 - Health Sciences XI
16:00 > 17:00	POSTER VIEWING & COFFE BREAK		
17:00 > 18:30	PARALLEL ORAL SESSIONS IV A1 - Environment II A2 - Economics and Management II A3 - Criminology and Law II A4 - Health Sciences IV	PARALLEL ORAL SESSIONS VIII A1 - Biological Sciences II A2 - History of Art, Heritage, and Cultural Studies II A3 - Arts IV A4 - Health Sciences VIII	PARALLEL ORAL SESSIONS XII A1 - Communication and Political Sciences A2 - Engineering III A3 - Health Sciences XII

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APRESENTAÇÃO | FOREWARD

Promover o desenvolvimento integral e o sucesso dos nossos estudantes é uma das missões mais prementes da Universidade do Porto. Para alcançar este objetivo, é essencial cultivar sinergias entre o ensino e diversas áreas, como investigação, inovação, empreendedorismo, cultura e artes, dentro de um modelo de formação integral.

Neste contexto, incentivar uma cultura científica entre os nossos estudantes de licenciatura e mestrado, os mais jovens da nossa universidade, é uma medida determinante. Estimulá-los a complementar a sua formação com atividades de produção e valorização do conhecimento é crucial para o seu crescimento académico e profissional.

O programa IJUP - Encontro de Investigação Jovem da Universidade do Porto tem sido uma das iniciativas mais impactantes neste sentido. Ao longo das suas 16 edições anteriores, contabilizou mais de 10.000 participantes e mais de 7.000 projetos científicos apresentados. Este ano, naquela que será a segunda maior edição de sempre, temos o privilégio de contar com mais de um milhão de estudantes inscritos e quase 700 novos trabalhos apresentados, cujos resumos poderão ser consultados nas páginas seguintes.

É com grande satisfação que constatamos que o IJUP não só se mantém relevante, como continua a crescer em vitalidade. A participação entusiástica dos estudantes, o apoio dos docentes e investigadores, e o empenho da nossa comunidade académica são testemunhos do impacto significativo deste evento.

O IJUP desempenha um papel crucial ao facilitar a transição dos estudantes do ambiente académico para o mundo da investigação, promovendo a experimentação científica e reforçando o estatuto da nossa universidade como um centro de investigação de excelência.

Agradeço, por isso, a todos os membros da comunidade académica que tornam possível a realização deste programa ao longo do ano. Desde os estudantes e orientadores responsáveis pelo desenvolvimento dos projetos apresentados, aos docentes e investigadores que integram a Comissão Científica e dão apoio à realização do programa, até aos técnicos que contribuem para a organização do evento final.

O empenho e dedicação de todos são fundamentais para o sucesso deste programa e, consequentemente, para o progresso da investigação na Universidade do Porto. Só assim o IJUP continuará a ser uma verdadeira escola de ciência e um estágio fundamental para muitos dos nossos jovens investigadores.

António de Sousa Pereira

Reitor da Universidade do Porto

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ORAL SESSIONS



U. PORTO





AGROFOOD

JUP 17.^a EDIÇÃO

21415 | Development of a new appealing, healthy, and sustainable food product using table grape waste

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Background & Aim: It is estimated that in Europe, fruit and vegetable waste is approximately 15% (FAO et al., 2022). In Portugal, table grape production contributes to this waste due to the product being rejected, because it does not fulfil quality criteria, such as size or sugar content. The aim of this study was to valorise the table grape surplus by developing a new food product, namely a grape-based roll. **Methods:** The following ingredients were tested in a preliminary study: surplus grapes, raisins, bananas, and almonds. The formulations were subjected to different temperatures (40, 50 and 60 °C) and drying times (13, 15, 19 and 37 h) in a discontinuous tray dehydrator. The thickness of the samples was also determined, and their adhesiveness and rollability assessed, both on a scale of 1-5 (1 - very low and 5 – very high). **Results:** Of the 30 samples evaluated, 12 had the desired characteristics (Figure 1). It was determined that for samples with 68-100% grapes, 13-15 hours at 60 °C are needed to obtain a fruit leather suitable for rolling. The addition of both banana and almond reduced the dehydration time by 2 hours. Formulations with almonds were only successful when they simultaneously contained banana. It was determined that the optimum thickness for high rollability was between 1.0 and 1.5 mm. For 100% grape-based formulations, lower yields were obtained (24-26%) when compared to other formulations with grape content of less than 78% (31-40%). **Conclusions:** It was possible to reuse grapes that would otherwise have been wasted, into a food product with appealing sensory characteristics, promoting the circular economy of the table grape sector.

Keywords: Fruit Leather, Grape Waste, Food Development.

Acknowledgments

To Herdade Vale da Rosa for their cooperation in providing data on grape production, for supplying raw materials and for collaborating in this study.

Nutripar - Food Knowledge, Herdade Vale da Rosa's partner company, for their collaboration in this study.

References:

[1] FAO, IFAD, UNICEF, WFP, & WHO. (2022). The State of Food Security and Nutrition in the World 2022 (The State of Food Security and Nutrition in the World (SOFI), Issue 978-92-5-136499-4). F. I. U. W. WHO.



Figure 1: Grape and banana roll.

21698 | Understanding climate change impacts on *Castanea sativa* Miller: Exploring mycorrhization as a mitigation approach

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Background & Aim: In the context of climate change, heat waves and drought are expected to rise in frequency and intensity in the Mediterranean region, impacting the growth of *Castanea sativa* Miller, a valuable crop in Portugal. Thus, sustainable strategies are crucial to ensure chestnut production in the face of these challenges. **Methods:** Aiming to address this issue, the potential of mycorrhization to boost the physiological performance of Marsol hybrid chestnut plants to combined heat (42 °C for 4 hours/day) and drought (no irrigation) stresses for 21 d was examined. **Results:** Revealed that heat stress did not negatively affect the growth and photosynthetic performance, nor induced oxidative stress in both mycorrhizal (MR) and non-mycorrhizal (NMR) plants. In opposition, drought (alone or in combination with heat) severely reduced the growth of NMR plants in terms of relative water content, production of new leaves, and foliar area. Furthermore, gas-exchange relations of NMR plants were also inhibited by water deficit conditions, which translated into reduced CO₂ assimilation. In contrast, ECM associations played a pivotal role in alleviating the adverse effects of such stresses, leading to reduced growth susceptibility in MR plants, even under the co-exposure scenario. Concerning photosynthesis, the presence of ECM allowed drought-exposed plants to ensure a carbon assimilation comparable to non-stressed plants. The analysis of oxidative metabolism revealed that NMR plants were more prone to stress, evidenced by elevated lipid peroxidation and hydrogen peroxide levels under drought conditions. Conversely, MR plants exhibited enhanced defence mechanisms, such as the accumulation of antioxidants, thus preventing oxidative damage. **Conclusions:** This study shows that drought is the most detrimental stress, with its effects being accentuated by heat co-exposure, and highlights mycorrhization as a strategy to enhance *C. sativa* climatic resilience.

Keywords: Global Warming, Combined Stress, Heat, Drought, Chestnut Plant.

Acknowledgments

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21754 | Immunoreactivity of Gal d 1 and Gal d 2 allergens as affected by food processing

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Background & Aim: Egg allergy is the second most common food allergy in childhood, being estimated to affect 0.5-8.9 % of infants/children. So far, different allergens have been identified in egg, namely ovomucoid (Gal d 1) and ovalbumin (Gal d 2), which are responsible for eliciting mild (atopic dermatitis) to potentially severe (anaphylaxis) reactions in allergic individuals [1,2]. The aim of this work is to assess the effect of food processing treatments and protein extraction methods on the immunoreactivity of Gal d 1 and Gal d 2. **Methods:** Proteins were extracted from raw/boiled (10 min) hen's egg using 7 buffers in two independent extraction conditions: 60 °C, 2h or 4 °C, overnight and analysed by SDS-PAGE in non-denaturing/denaturing conditions. The immunoreactivity was evaluated by immunoblotting with antibodies against Gal d 1/Gal d 2. **Results:** SDS-PAGE results showed that proteins were effectively extracted using different buffers, presenting similar profiles, except for the ascorbic acid in the case of boiled egg. The protein profile of raw egg exhibited intense bands for most buffers, being quite distinct from the boiled egg. In the later, the protein profile was clearly affected by processing and buffer used for protein isolation. Gal d 1 in boiled egg exhibited the expected band at ~28 kDa, but also bands at ~50 kDa, ~100 kDa, ~150 kDa, except for ascorbic acid buffer. The bands at molecular weight >28 kDa suggest the formation of aggregated forms of Gal d 1 due to high temperatures (100 °C). The immunoblotting analysis of Gal d 2 in raw egg showed an intense IgG-reactive band at ~44 kDa, indicating the presence of ovalbumin in all extracts, with a clear band at ~90 kDa, resulting from natural aggregation tendency of this allergen. **Conclusions:** The immunoreactivity of both allergens, Gal d 1 and Gal d 2, seemed to be differently affected by the boiling conditions and extraction buffer. These effects are currently being investigated using different processing treatments (e.g., baking).

Keywords: Hen's Egg Allergy, Food Processing, Protein Extraction, Thermal Treatment.

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- [1] Sicherer et al. (2014). <https://doi.org/10.1016/j.jaci.2013.12.1041>.
- [2] Savage et al. (2007). <https://doi.org/10.1016/j.jaci.2007.09.040>.

21756 | Protein characterisation of black and white sesame using different extraction protocols

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Background & Aim: Sesame is widely consumed in Western countries for its organoleptic properties and health benefits, being used in numerous nutritious products, including vegetarian meals, bakery/confectionery products [1]. However, sesame is considered an allergenic food with rising allergy prevalence (0.1-0.2%) among the European/USA population and can cause serious adverse reactions in sensitised/allergic individuals [2]. This work aims to assess the efficiency of several extraction protocols to select the best candidate for the structural/immunoreactivity characterisation of black/white sesame proteins. **Methods:** Proteins were extracted from raw black/white sesame seeds using 7 buffers with distinct pH and ionic forces in two different extraction conditions: 60 °C, 2 h or 4 °C, overnight. Protein profiles were assessed by SDS-PAGE in non-denaturing/denaturing conditions. **Results:** SDS-PAGE in non-denaturing conditions demonstrated several bands <10 kDa, possibly corresponding to the larger subunit of 2S albumins, in almost all extraction protocols, except for ascorbic acid at 4 °C. Intense bands within 45-50 kDa, corresponding to vicilins and legumins, were observed in all extraction protocols performed at 60 °C, except for ascorbic acid and H₂O (pH 9) buffers. Other minor bands between 25-45 kDa were also visible, probably corresponding to subunits of cupins. SDS-PAGE in denaturing conditions showed two distinct groups of intense bands at ~30 and ~20 kDa in both black and white sesame protein profiles, possibly corresponding to subunits of cupins. More efficient extraction was obtained with Tris-SDS (4%), PBS (0.2 M) at both 4 °C and 60 °C extraction conditions, although H₂O (pH 12), NH₄HCO₃ and Tris-HCl (100 mM) also allowed isolating proteins with good efficiency at 60 °C. **Conclusions:** These results showed the application of several protocols for the highly efficient extraction of sesame proteins to be further applied in immunoreactivity studies with sera from sesame-allergic patients.

Keywords: Extraction Protocols, Sesame, Food Allergy, Proteins.

Acknowledgments

This research was supported by national funds (FCT) through project Hypoallergen (PTDC/BAA-AGR/4005/2021), and FCT/MCTES (UIDP/50006/2020). JC and IM thank FCT for funding through (2021.03583.CEECIND/CP1662/CT0012 and 2021.03670.CEECIND/CP1662/CT0011).

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21760 | Structural and immunochemical characterisation of gamma-conglutin from different lupine species

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Background & Aim: Lupine is a very versatile ingredient used in numerous processed foods, but it is also an important allergenic food, with some identified allergens causing serious allergic reactions in sensitised/allergic individuals [1,2]. This work aimed at characterising gamma-conglutin immunoreactivity (major lupine allergen) from the most economically important lupine species (*Lupinus albus*, *L. luteus* and *L. angustifolius*) by testing different extraction protocols. **Methods:** Proteins were extracted from all lupine species using distinct conditions of pH, ionic forces, incubation temperature (60 °C and 4 °C) and time (2 h or overnight). Protein profiles were evaluated by SDS-PAGE in non-denaturing conditions and the gamma-conglutin IgG-binding capacity were assessed by immunoblotting. **Results:** SDS-PAGE suggest that the lupine protein profile varies among species/varieties, with intense bands between 50-75 kDa in all species and 10-15 kDa in *L. albus* and *L. luteus*, corresponding mainly to different subunits of conglutins. A distinct IgG-binding pattern was also observed for gamma-conglutin, depending on the lupine species. Bands at a molecular weight >200 kDa correspond to the intact/native protein, while more intense bands observed between 40-75 kDa correspond to different subunits of gamma-conglutin. Clear protein profiles were obtained with almost all extraction protocols, excepting for ascorbic acid and H₂O (pH 9). Efficient gamma-conglutin extraction was obtained by different buffers according to lupine species. In fact, the best extraction protocol for *L. albus* and *L. luteus* gamma conglutin was overnight at 4 °C using Tris-SDS and Tris-HCl, respectively. In the case of *L. angustifolius*, PBS (0.2 M) overnight at 4 °C provided best protein extraction. **Conclusions:** This study demonstrates that protein profiles and immunoreactivity differ with the lupine species. Additionally, the importance of selecting proper and efficient extraction protocols for each lupine species is herein presented.

Keywords: Lupine, Gamma Conglutin, Immunoreactivity, Protein Extraction.

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21761 | Potential cross-reactivity of *Alphitobius diaperinus* larvae in crustacean-allergic patients as affected by physicochemical treatments

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Background & Aim: Edible insects are considered emerging protein sources and valuable alternatives to animal meat. Lesser mealworm (*Alphitobius diaperinus*) is one of the 4 species regulated by the European Union as a novel food [1]. Although it is considered safe for human consumption, main concerns on its potential allergenicity were raised, highlighting the potential cross-reactivity for crustacean-allergic patients. Therefore, this work aims at evaluating the IgE-binding capacity of *A. diaperinus* larvae as affected by processing using pool sera from crustacean-allergic patients. **Methods:** Proteins were extracted from dried larvae and commercial larvae flour of *A. diaperinus* using 3 protocols: (A) 7 buffers and 2 incubation conditions (60°C, 2h or 4°C overnight); (B and C) pH-based protocols. Protein profiles were analysed by SDS-PAGE in non-denaturing conditions and the IgE-binding capacity was evaluated by immunoblotting with crustacean-allergic patients' sera. **Results:** SDS-PAGE showed that the protocol A with Tris-SDS buffer (4%, pH 7.6) extracted the highest variety of proteins from *A. diaperinus* dried larvae. The same buffer was also the most efficient to extract proteins from the commercial flour, however only four faint bands (75, 65, 37 and 27 kDa) were observed. Immunoblotting showed that different proteins extracted from dried *A. diaperinus* larvae were IgE-reactive with sera of crustacean-allergic patients, but the same was not observed in the commercial flour, which did not show any band. **Conclusions:** Dried *A. diaperinus* larvae proved to be cross-reactive to crustacean-allergic patients. However, the same did not occur for the commercial larvae flour, suggesting that it was subjected to harsh physicochemical treatments that affected the structure of the allergen epitopes, with the consequent elimination of its IgE-reactivity. Further experiments will be conducted to evaluate the effect of other physicochemical treatments (e.g., microwave) in *A. diaperinus* larvae allergenicity.

Keywords: *Alphitobius Diaperinus*, Cross-Reactivity, Sera of Crustacean-Allergic Patients, Percent to Processing.

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This research was supported by national funds (FCT) through project Hypoallergen (PTDC/BAA-AGR/4005/2021), and FCT/MCTES (UIDP/50006/2020). JC and IM thank FCT for funding through (2021.03583.CEECIND/CP1662/CT0012 and 2021.03670.CEECIND/CP1662/CT0011).

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[1] Regulation (EU) 2023/58. Commission Implementing Regulation (EU) 2023/58 of 5 January 2023 authorising the placing on the market of the frozen, paste, dried and powder forms of *Alphitobius diaperinus* larvae (lesser mealworm) as a novel food and amending Implementing Regulation (EU) 2017/2470. Official Journal of the European Union, L5, 10-15.

21983 | Can glyphosate trigger an intergenerational response in crops? – a case study in tomato plants (*Solanum lycopersicum* L.)

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Background & Aim: Despite their harmful environmental footprint, chemical pesticides have been a useful tool to fight pests that compromise crop yield. Glyphosate (GLY), the most used herbicide globally, has been considered environmentally safe by the agroindustry, though recent works have showed it can prompt acute effects on non-target organisms, including crops. Yet, there are still many gaps on its long-term consequences, like its potential to induce intergenerational effects. Thus, this study aims to be pioneer on this topic, using tomato plants (*Solanum lycopersicum* L. cv. Micro-Tom) as a model crop. **Methods:** To unravel potential offspring effects, F0 tomato seedlings were grown in perlite contaminated, or not, by GLY at different concentrations (0, 2.5, 5.0 and 7.0 mg/kg) until fructification. Next, seeds from CTL and GLY 2.5 were collected, and a new growth trial was carried out (28 days), with both F0 and F1 seedlings being exposed to GLY (2.5 mg/kg) to analyse potential differences in sensitivity. **Results:** Results showed fructification was delayed by weeks by GLY on a dose-dependent manner; the cumulative number of fruits, their biomass and number of seeds were significantly reduced, over the control (CTL). Both sets of seedlings responded similarly to GLY exposure, but those derived from GLY-exposed parents showed less inhibitory effects on plant growth, mainly on biomass root production. Looking at the shoots' redox status, the level of lipid peroxidation was only increased by GLY in CTL parents-derived plants, while hydrogen peroxide level was enhanced by the herbicide, regardless of the parental condition. Proline levels were only changed by the parental condition; GLY-mediated reduction of GSH accumulation varied with the parental condition, as only plants derived from CTL parents decreased GSH levels in response to the herbicide. **Conclusions:** Overall, data showed that GLY impairs plant reproductive performance and may induce intergenerational effects, as GLY-mediated impacts on F1 plants depended on previous parental exposure.

Keywords: Crops, Glyphosate, Reproductive Performance, Oxidative Stress, Intergenerational Memory.

22069 | Use of endophytic yeasts as biological control agents to reduce powdery mildew and anthracnose in strawberry under greenhouse conditions

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Background & Aim: Powdery mildew and anthracnose are fungal diseases causing important yield losses and negatively impacting fruit quality in several crops. The use of Biological Control Agents (BCAs) is an innovative and promising alternative to synthetic fungicides for controlling fungal diseases [1]. BCAs, or by-products like its exudates, can act as antagonists inhibiting the growth of fungal pathogens, but can also enhance plant defence mechanisms improving disease tolerance. Although some studies have demonstrated the promising role of some BCAs, more work is still required to optimize and understand their mode of action in controlling diseases in field conditions [2]. Therefore, this work aims to determine the efficacy of the pre-harvest application of yeast exudates in the control of powdery mildew and anthracnose in strawberry plants. **Methods:** The exudates of two yeast species (supplied by Proenol Lda) were applied, individually and combined, to strawberry plants (grown in a semi-hydroponic system in a greenhouse; Campus de Vairão, FCUP) through leaf spraying. Applications took place every 2 weeks, throughout the cultivation cycle (12 applications in total). Powdery mildew and anthracnose incidence on plants was monitored twice a week, and the number of infected fruits was registered. Moreover, an ‘*in vitro*’ assay was conducted to evaluate the potential antagonistic effect of the exudates on *Colletotrichum acutatum* growth (causing anthracnose disease). **Results:** Greenhouse disease monitoring revealed that yeast exudates were able to reduce powdery mildew incidence (by 74.5 %) when compared with the control condition (untreated plants). The ‘*in vitro*’ assay showed that one of the tested exudates completely inhibits *C. acutatum* growth in PDA medium. **Conclusions:** Our results highlight the potential of yeast exudates to be used as BCAs to control fungal diseases. More assays are being conducted to determine if these exudates also have an elicitor effect triggered plant defence mechanisms.

Keywords: *Colletotrichum Acutatum*; Plant Elicitor; Fungal Diseases; *Podosphaera Aphanis*

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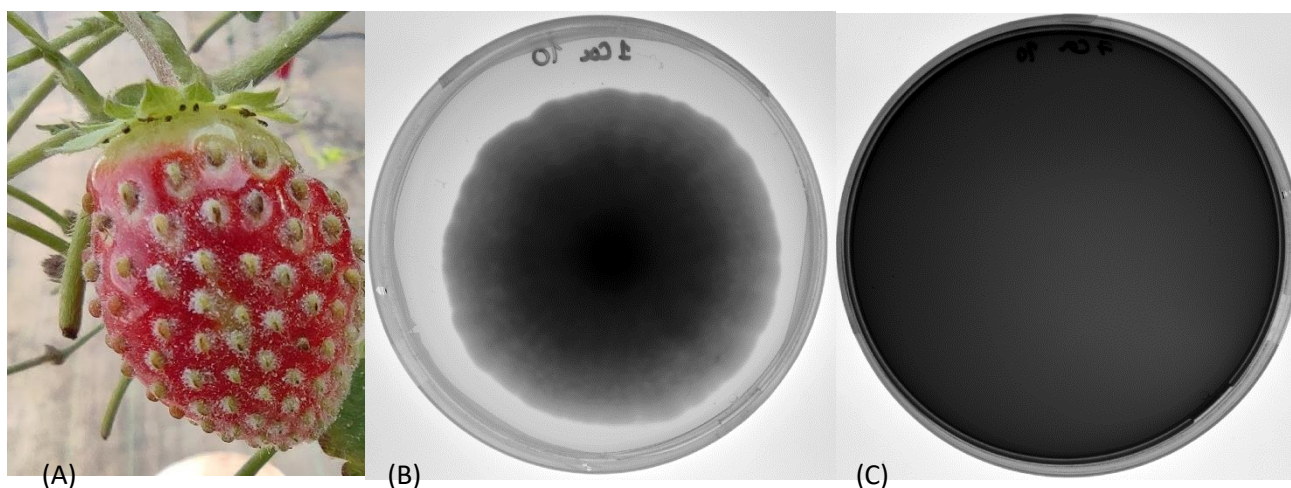


Figure 1: (A) Strawberry fruit grown in a greenhouse (Campus de Vairão, FCUP) infected with *Podosphaera aphanis*; (B) and (C), Control and exudate treatment, respectively, of the ‘*in vitro*’ assay demonstrating potential antagonistic effect of the tested biological control agents (BCAs) against *Colletotrichum acutatum* growth.



ARCHITECTURE



21385 | Urbanism of the Human Flows. Buenos Aires as a starting point

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Background & Aim: The purpose of this work is to analyse the main urban and architectural impacts on the city of Buenos Aires caused by the most important human flows to or from the city, within a time frame from the earliest records and 2023. There is no known existence of studies based on these premises. The existing works are of a historical nature, punctual approaches to the city's urban and architectural development and demographic data, but they are not related to each other. **Methods:** The approach was made through an interdisciplinary method, various types of written documents from the fields of architecture, urbanism and history, as well as legal, literary, statistical data, and graphic documents such as cartographies of different scales, plans, illustrations and schemes. It is organised chronologically. The first step was to study the human flows and the historical context, to synthesise this information to highlight the impact of the flows on the city's urban structure and architecture. **Results:** Seven representative moments of the main flows to and from Buenos Aires were identified, which are defined by their cause, characteristic or place of origin, which determines their identification, resulting in temporal overlaps in more recent periods. These are: original (... - 1580), colonial (1580 - 1816), labour (1816 - 1880), mass (1880 - 1914), last overseas (1914 – 1960's), bordering and emigratory (1930's - 2023). Each moment was translated into a descriptive text, a plan overlaying the city at the initial and final dates of the flow, always at the same scale, a population graph, and a chronological timeline of sociopolitical events. **Conclusions:** The importance of urban and architectural analysis of cities based on human flows is evident so that their development and planning can be inclusive. This work is the starting point for a new field of work and research.

Keywords: Architecture, Urbanism, Buenos Aires, Human Flows, History.



Figure 1: Map of all migratory flows to and from Buenos Aires and Argentina since its colonial foundation in the 16th century. These flows are in gradient, getting darker as you progress chronologically.

Malagueira

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Background & Aim: Light, as an oscillating matter, has the ability to shape space, to accentuate its specificities and contours, becoming decisive for our perception of the space itself. In the context of housing, which we ideally consider to be a personalised and intimate space, light ends up becoming a determining element for the definition of its shape and the appropriation that is made of it, sometimes influencing in a decisive way the daily experiences within itself. It is important to note, however, that the light to which we refer to is obviously not something static, permanent or immutable. Light is, by its very nature, fluid, which could mean that the same space, depending on the seasons, day and time, can undergo significant changes. Yet, more importantly, light changes according to the concrete or sensory needs of the inhabitants of each space, which shape it to create a personal experience. **Methods:** Taking housing and its interaction with light as the object of study, this work will address a vast set of framing questions. These will arise not *per se*, but depending on our object of analysis, in this case the Malagueira neighbourhood by Álvaro Siza, seeking to capture the experiential circumstance of light in a specific space and time. **Results:** This way, it's possible for us to mould its concrete elements and, at the same time, take advantage of their sculptural quality in a way to challenge its light design, whether due to its material dimension or symbolic force, as it is constituted as something that is capable of inducing and modifying our daily experience. **Conclusions:** Thus, this exploration constitutes not only a contribution to the discussion around the design of current housing, emphasising the sensitivity in the act of domesticating the space, but also placing light as a critical element capable of shaping the living experience. This research integrates an on-going master thesis on Master's Degree in Architecture at FAUP, carried out on the supervision of Prof. Marta Rocha.

Keywords: Light, Domestic, Malagueira, Housing.

Acknowledgments

Malagueira: Heritage for all. Contributions for the its nomination. (MALAGUEIRA.PT) Research Team.

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Background & Aim: The current need for a sustainable development of architecture, due to an increasingly complex climatic context, has resulted in an increment of the construction regulations, mainly in terms of environmental performance of buildings. However, these regulations are very restrictive and usually don't distinguish the new construction and the interventions in the built environment, which can result in projects that are unadjusted to the pre-existing logics and the conservation of heritage values [1]. The investigation approaches this problem, positioning itself in the relation between the contemporary construction demands and the intervention in heritage buildings and analyses problematics related to the association of the old and the new, and the notion of comfort. The Bioclimatic Rehabilitation thus emerges as a way to explore a more sustainable design practice that seeks to guaranty the minimum comfort conditions and the energy efficiency for the rehabilitation project by relating architecture and climate. But it does not forget the analysis of the heritage values, through the concepts of authenticity and integrity, important to identify the singularity and ambience of the building.

Methods: The investigation resorted to the analysis of case studies to outline strategies for the rehabilitation project of a factory of the beginning of the 20th century, in Warsaw, as a method for understanding the basis of a conscious bioclimatic intervention. **Results:** The project, which resulted from the 17th Saint-Gobain Architecture Student Contest of 2022, granted the opportunity to intervene in a context much different from the Portuguese, and pushed the climate adaptation to the limit to test its constraints. **Conclusions:** All things considered, it was possible to identify the need for an adaptative rehabilitation to not override its authenticity and integrity, and the comfort levels were questioned for its rigidity, given the possibility to adjust to the seasons through clothing and the adaptative capacity of the human body [2].

Keywords: Bioclimatic Strategies, Rehabilitation, Authenticity, Energy Efficiency, Comfort.

Acknowledgments

I would like to thank Prof. Dr. Eliseu Gonçalves for supervising this investigation as part of my master's dissertation in the MIArq; and Saint-Gobain for providing the opportunity to participate

in the contest and get in touch with the different perspectives of the participants from around the world.

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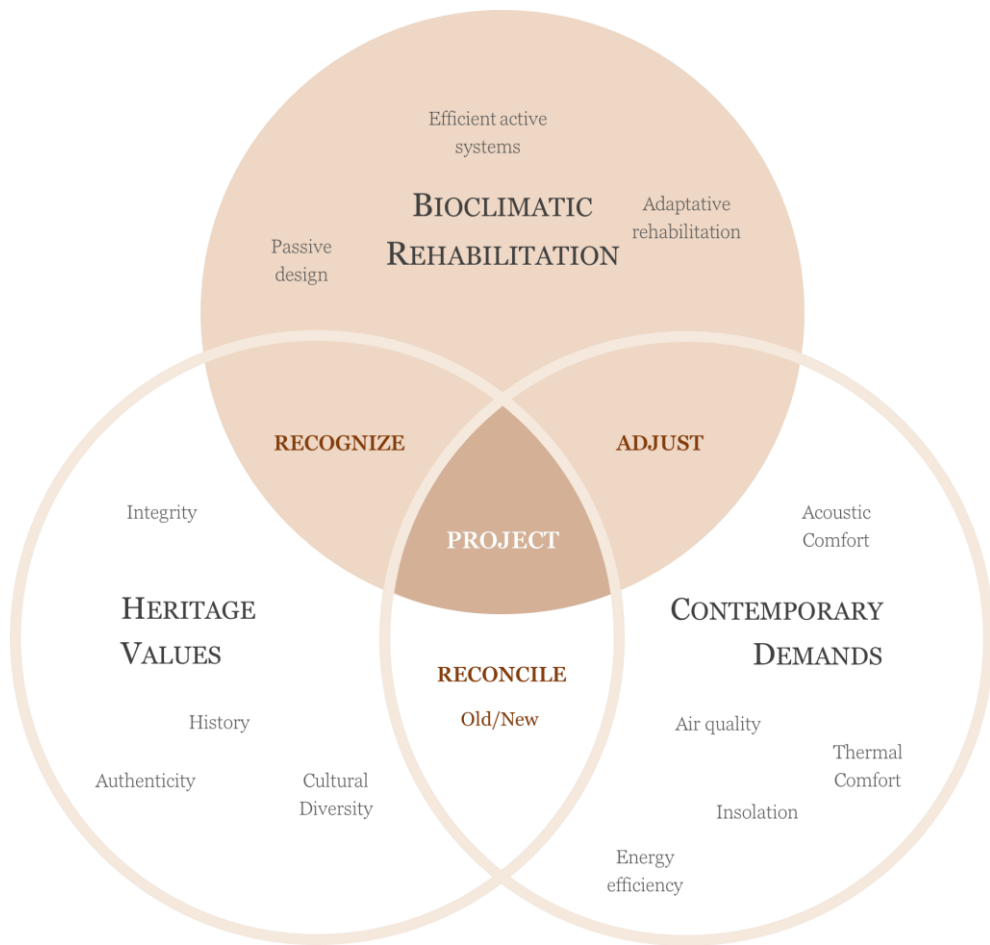


Figure 1: A path to the development of a sustainable, conscious, and comfortable project.

21494 | Visual Urban Quality: Impact on Health and Well-being

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Background & Aim: Living longer presents challenges, as an extended lifespan does not always equate to improved quality of life or health. Recognising the profound influence of the urban landscape on health, recent innovative studies have deepened our understanding of this issue. However, despite these advancements, no approaches were identified directly linking the visualisation of specific urban elements to individuals' health and well-being. This study thus introduces an innovative method for assessing the visual quality of space concerning health, including a prototype analysis focused on three areas within São Roque da Lameira in Porto: Area A (Affordable Houses Neighbourhood, 1939-43), Area B (Improvement Plan Neighbourhood, 1959-62), and Area C (section of São Roque da Lameira Street). The parameters studied include Aesthetics, Physical Activity Encouragement, Naturalness and Extent/Intensity.

Methods: The analysis method is rooted in a database compiling relationships between the visualisation of specific urban properties/elements and their impact on health, drawing insights from various scientific domains. The methodology comprises quantitative and qualitative analyses, employing a five-point scale, in which 1 indicates poor visual quality and 5 denotes optimal visual quality. **Results:** Results suggest that while Area C is the most Aesthetic (3.30) but the least Natural (2.40), Area B is the least Aesthetic (3.09) but stands out in Physical Activity Encouragement (3.45), Naturalness (3.09), and Extent/Intensity (3.55). **Conclusions:** Assimilating the intricate relationship between the visual landscape and health demands ongoing multidisciplinary research. Hence, the prototype analysis results remain open to further database refinement. An essential future prospect involves expanding the analysis to include more urban areas or cities, allowing a comparative assessment of visual quality across diverse urban landscapes and enhancing our understanding of visual environments' health impact.

Keywords: Urban Development, Visual Quality, Health, Well-Being, Porto.

Acknowledgments

This research constitutes part of a Master's Dissertation within the Integrated Master's Degree in Architecture at FAUP, carried out under the supervision of Professors Gisela Lameira and Ana Fernandes. Additionally, this study was conducted as an integral part of the funded research

project CAOP - Climate Adaptation for Older People living in Vulnerable Urban Areas (PTDC/GES-URB/2038/2021), which involves the Faculty of Engineering, Architecture, and Pharmacy of the University of Porto and the University of Coimbra.

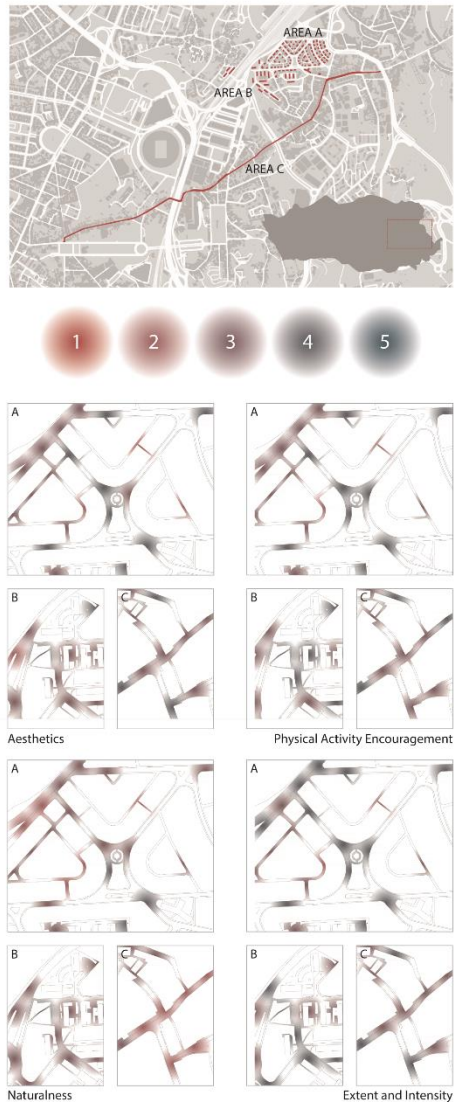


Figure 1: Results of the Visual Quality Assessment of São Roque da Lameira in Porto.

21536 | Double Door: Three Distances Between Doors in House Design.

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Background & Aim: The door, from the Latin word, *portare*, meaning to carry or transport, appears in architecture as an opening. It is an element that connects and separates spaces, causing both openness and closure, establishing and nullifying boundaries. In dwellings, where imagining a house without doors is challenging, the door presents potential inherent in the flexibility of domestic space. **Methods:** *Double Door: Three Distances Between Doors in House Design* is an investigation that aims to study how spaces within a house can be transformed through the door, revealing the history, origin, and significance of it. Throughout the study, the double door gains prominence. The use of this element, characterized by two independent and adjacent doors whose individual opening does not connect two spaces, but whose simultaneous opening does, is considered at three possible distances between the two doors: minimal, intermediate and significant distance. **Results:** The first distance involves the most common use of the double door, often found in hotel rooms, encouraging its use as an elastic element in homes, contracting and expanding them by altering the number of compartments. In the other two distances, the adjacent doors have more space between them. The intermediate distance perceives the void between doors as a limited useful space, suitable only for momentary use, and can be occupied, but not lived in. In the case of the significant distance, the void becomes an additional compartment in the house, to be enjoyed and shared, exploring diverse uses through the spatial ambiguity that distinguishes it within the home. **Conclusions:** Unravelling the *mysteries* introduced by the double door in domestic environments, focusing on how the three distances operate within the house spaces, is the objective of this study stemming from the Integrated Master's thesis in Architecture at FAUP. This research is being carried out under the supervision of Professor Marta Rocha.

Keywords: Architecture, Door, Double Door, Between Doors, Dwelling.

21554 | The journeys of the *Fernando Távora Prize* as a research practice in architecture

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Background & Aim: The act of traveling includes a significant learning component, stimulated by the experience acquired in direct contact with other realities. For the architect, it's an essential part of their education, as an irreplaceable research method. From Athens to Japan, Fernando Távora (1923-2005) made a series of journeys that contributed to his formation as a person, architect and teacher. A unique episode in his career was the 1960 trip to the USA thanks to a scholarship granted by the *Calouste Gulbenkian Foundation*¹. As a posthumous initiative, the OASRN praised the master and his desire to travel by creating the *Fernando Távora Prize*² in 2005, thus consolidating Távora's methodological, pedagogical and cultural legacy. This essay, framed within a master's dissertation under development³, aims to compare, in a common approach, the trips undertaken in terms of the objectives, methodologies and strategies that a research trip requires, comparing motivations and results. **Methods:** Through a solid base of knowledge⁴, the various authors' movements are densely mapped out, resulting in a potentially hypothesis-forming interpretive framework. Their testimonies reveal intersections and overlaps in their respective journeys, similarities and dissonances in their methods of observation and communication, as well as the efforts and adversities inherent in physical travel. **Results:** 19 journeys⁵ have been proposed across all continents, whose themes either diverge or complement each other. Among these, the geographical breadth, variable timeframes, travel plans not always corresponding to their execution, as well as heterogeneous research methodologies, are highlighted. Europe has been the primary territory for research endeavours, with Portugal experiencing a recent increase in applications. **Conclusions:** The *Fernando Távora Prize* singularizes and broadens a new understanding of the journey within the architect's research and professional practice, whose critical scrutiny remains preambular today.

Keywords: Journey, Research, *Fernando Távora Prize*, Education, Knowledge.

Acknowledgments

Secção Regional Norte da Ordem dos Arquitectos (OASRN)

References:

- [1] The trip took place between February 13 and June 12 of 1960, with the aim of "*Studying the Methods of Teaching Architecture and Urbanism in Universities and Institutions*" of notable prestige in the USA, while simultaneously seeking answers to the problems of teaching architecture in Portugal and the practical development of new urban planning proposals.
- [2] Unprecedented on the national scene, it awards an annual monetary grant for a trip within the scope of a research proposal.
- [3] The Master's Dissertation is part of the research project VOZES VIVAS, based at the *Centro de Estudos de Arquitectura e Urbanismo* (CEAU) of the *Faculdade de Arquitectura da Universidade do Porto* (FAUP), both under the guidance and coordination of Professors André Santos e Maria José Casanova.
- [4] It consists of regulations, application proposals, excerpts from the jury's minutes, essays, press reports, travel records, final reports, public conferences, travel booklets published by *Ordem dos Arquitectos*, among other archival elements that seem relevant to the research.
- [5] 1st – Netherlands, UK, France, Brazil and USA; 2nd - Brazil, Madeira and Azores Islands; 3rd - Sri Lanka and East Timor; 4th - Namibia; 5th - Switzerland, Turkey, Greece and Italy; 6th – Japan and USA; 7th - Luanda; 8th - India, Sri Lanka and East Timor; 9th - Japan, Norway, Finland, Sweden, Germany, Czech Republic, Austria and Switzerland; 10th - France, Italy and UK; 11th - Kenya; 12th - USA; 13th – UK, Germany, Switzerland and USA; 14th - Portugal; 15th – Mexico, USA, Guatemala and Belize ; 16th - Portugal; 17th - Switzerland; 18th - Azores and Iceland; 19th – Spain, France, Belgium, Germany, UK and Luxembourg (ongoing).

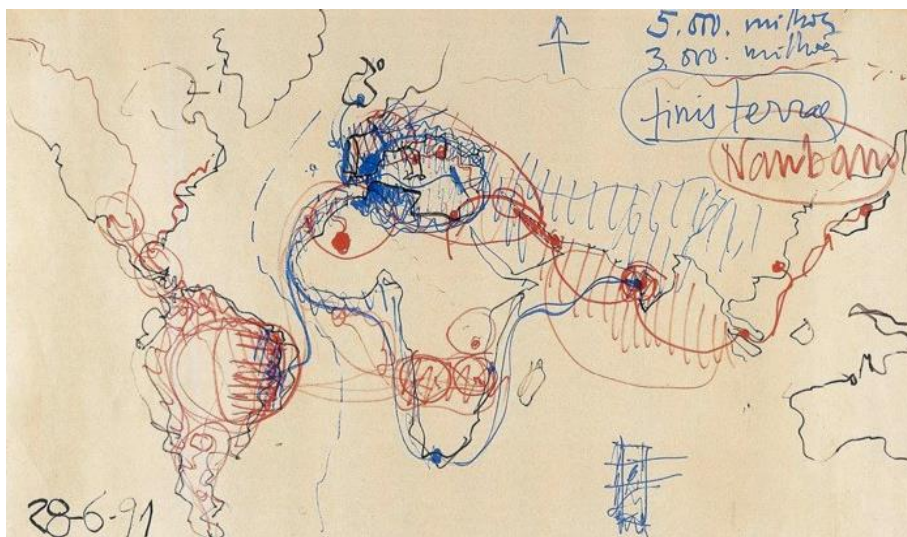


Figure 1: Fernando Távora drawing, 1991 [World map with the voyages of the Portuguese discoveries]

21558 | The Algarve's forgotten Modern Architectural Heritage: the case of the Gago

Rosa House

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Background & Aim: Often, when learning about Portugal's modern architectural heritage and its proponents, there is an inclination to focus on the same few architects and their influential accomplishments in Porto and Lisbon. However, in the Algarve urban centres, built mainly in the last century, a remarkable sum of valuable builds lay. Amid Faro's chaotic architectural atmosphere, there are more than 500 modern buildings that constitute landmarks for the region and, therefore, should be recognized. Manuel Gomes da Costa led the Modern Movement in the South of Portugal, having designed hundreds of buildings just in its capital. However, his acknowledgment as a crucial figure for the movement was only established in the last few decades and is still exceptionally dim. His architecture, like other lesser-known quality architects' work, is in danger and at risk of mischaracterization, wither, and demolition. **Methods:** The Gago Rosa house in Faro is an example of architectural excellence, but its existence as a piece of the city's and its residents' history is in jeopardy. Therefore, it is becoming increasingly important to establish the value of buildings such as these so we can intervene with skill, information, and enlightenment. Thereby, examining the houses' recorded history by analysing its original drawings, old photographs, the architects' recurrent expression, documenting its current state, as well as understanding its history through the lens of its occupants throughout the years, can contribute to the memorialization of the building's history and its influence on the architect's work, on the city of Faro, and the region. **Conclusions:** This research that aims to uncover the untold story of a significant work of modern architecture in Portugal resulted in an architecture monograph that underlines the significance of researching the Algarve's forgotten Modern Architectural Heritage. This presentation is part of a Master's dissertation carried out under the supervision of Professor Marta Rocha.

Keywords: Modern Architecture, Heritage, Manuel Gomes da Costa, Algarve.

21564 | The evolution of Habitar in theater scenes, between 2000-2020, at TNSJ

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Background & Aim: The way of living is closely related to the space in which we develop the most varied domestic tasks, which makes the space inseparable from the task to be developed. This conjuncture has led to the development of domestic spaces and, in particular, the way they are represented. With the growing relationship between architectural discipline and scenic discipline, the latter has become a device of memory and exposure of the way it is inhabited, so it has become interesting to study how this relationship develops on the stage of the Teatro Nacional São João, over 20 years. **Methods:** Throughout the research, the use of architectural design is explored as the maximum exponent in the scenic representation of a theatrical work. Drawing, an element of union of both disciplines, allows us to perceive how a family inhabits the most varied domestic spaces. **Results:** Domestic spaces are represented in a variety of ways, from isolated spaces to the junction of two or 3, to the vertical cut of a House. In this sense, the various forms of representation will be presented in order to obtain the evolution of domestic spaces according to the theatrical stage. **Conclusions:** In this way, the development of domestic spaces will be studied through their scenic representation, with special focus on the use of vertical cutting as a tool of this exhibition. As support, the works that passed through the São João National Theater will be used, in order to limit the field of investigation and focusing on the Portuguese case. This research is part of the Master's Dissertation for the conclusion of the Integrated Master's Degree in Architecture, developed under the guidance of Professor Marta Rocha.

Keywords: Drawing, Vertical Cut, Dwell, Scenario, Home.

Eraritjaritjaka, 2006

European House, 2007

Saturday Night, 2011

Castro, 2020



21599 | Between Sea and Land - Urban development proposal for the preservation of the cultural and architectural heritage of the town of Apúlia

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Background & Aim: The work I present here had as its starting point my personal interest in issues of conservation of cultural and architectural heritage combined with the desire to promote a movement to change the architectural and urban panorama of my home town - Apulia. **Method:** The presentation is divided into three parts: an initial phase of study of the town's entire known past up to the XXI century, in which we seek to understand how this is reflected in the territory; followed by a study of the current situation carried out on site, which allows a full understanding of the main problems that must be taken into account when developing future plans; and a final conclusive phase in which we seek to establish a long-term intervention strategy developed in the two previous moments. One of the main themes involved involves the relationship between Man and the Sea, the way in which this has changed, and what its consequences are, as well as the search for solutions so that it is possible to continue to inhabit this region, taking advantage of the natural resources it offers. This includes the harvesting of sargassum and the cultivation of masseira fields, typical of the northern coastal region of Portugal. **Results:** Carrying out a characterization study, covering the distant past, recent and contemporary times, was fundamental for the development of an intervention strategy that seeks to promote the preservation of cultural, natural and heritage values while promoting the sustainable development of the region. at various levels. **Conclusion:** The primary interest of this exhibition is to raise awareness of the harmful consequences of excessive exploitation of coastal areas, particularly the dune ranges; draw attention to the urgency of resolving problems linked to coastal erosion; promote greater care for architectural heritage, but also for cultural heritage. Apúlia appears as a case study for a problem that extends to all regions of the Portuguese coast.

Keywords: Apúlia, Sea, History, Heritage, Territory.

21712 | Travel in Architecture: Between life and work

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Background & Aim: The experience of travelling is inherent to the learning process of the architect and a necessary practice for the construction of a cultural framework. This work aims to focus on the theme of *travel* as an active instrument to learn, like a source of knowledge for the practice of architecture. Involved in the project *Vozes Vivas*, the approach intends to build a research on the lives of personalities, who during the 20th have studied and taught at the *Escola Superior de Belas Artes do Porto* and subsequently have held teaching positions at the *Faculty of Architecture of the University of Porto*. **Methods:** To collect the information and to find common points about the trips made by the architects in study, this research proceeds by reading publications, searching through archives, analysing drawings and carrying out conversations with them. **Results:** It is intended to unveil the concept of *travel* and its value for the practice of architecture, as well as understand how the architecture trip is distinguished from any other type of trip. The study will focus on specific trips, carried out by people moved by similar interests, but who can also have different points of view. By relating the memories, experiences and stories of each character, the work tries to identify common themes that are influential in the construction of an identity; to understand the personal and pedagogical motivations of each character, why they travel and how architectural culture is incorporated into design and teaching methods; to understand how the enthusiasm of discovery is passed by fellow travellers. **Conclusions:** The culture of travel in the architecture is a theme that unfolds several questions that are highlighted and that prove to be fundamental for the architect - for example: the relationship between travelling and memory, the interaction between cultures, travelling partners and the overlapping of ideologies as well as the different ways of seeing the same places. All of these factors are related with the personal experience of each one, and this becomes clear on the ways of recording the information collected on each trip.

Keywords: Architectural travel, Learning instruments, Collective Memory.

22003 | The project of Modern Brazilianness: Intersections between Architecture and Music from 1922 to 1964

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Background & Aim: This research commits to the comparison between Brazilian Modern Architecture and Music between 1922 and 1964 [1]. It aims to understand the various points of view of both arts on the idea of national identity and how Modern thinking led to the most symbiotic relationships between them. **Methods:** The guiding principle of this work is that there was a *Kunstwollen* ("will to art")[2] at that time that crossed the two compared scopes, which provided the most varied similarities between them. The present research on Modern Brazilianness was split into three sections: its prelude, analysed in the comparison between the neo-colonial architecture and the samba in Rio de Janeiro; its consolidation, construed through the trajectories of Lucio Costa and Heitor Villa-Lobos; and its sublimation, expressed by the affinities between the works of Oscar Niemeyer and the narratives of the Bossa Nova genre. **Results:** This research has come to several results in theoretical matters. Most importantly, it shows that the breakthroughs of a genuinely Brazilian art only took off from the moment when the country's intellectuals became willing to think within the new standards of modernity. By comparing the works of Lucio Costa and Heitor Villa-Lobos, it becomes clear that such cultural reinvention entailed the ability to carefully refer to Brazilian roots without formalisms, which paved the way for the emergence of a truly distinct mark in the works of Niemeyer and the Bossa Nova genre afterwards. Both were able to finally create the image of a sophisticated country that aimed for the future in an uninhibited way. **Conclusions:** The Modern Brazilianness reveals itself as a deeply complex, heterogeneous and sensitive topic. Its study from the perspective of both Architecture and Music offers a broader panorama of the theoretical concerns of a nation eager for cultural independence, a nation "condemned to be modern"[3].

Keywords: Brazilian Architecture, Music, Brazilianness, Modern Movement.

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Figure 1: Oscar Niemeyer and Tom Jobim in Brasília. 1960. Available in: <http://casaforte.blogspot.com/2015/11/oscar-niemeyer-e-tom-jobim-em-brasilia.html> (Access in: 21/03/2022).

22070| Valorization of archaeological Roman gold-mining cultural landscapes in “charnecas”

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Porto, Portugal¹

Background & Aim: Expressed in the landscape by the remains of archaeological structures of gold exploration, the north-eastern slope of the Serra de Santa Justa, in the regional protected landscape of “Parque das Serras do Porto”, is home to part of what is the Largest Underground Gold-mining Complex of the Roman Empire. These cultural remains are invaluable pieces of the landscape and are mostly threatened by human activity, often vandalized, or even partially destroyed. This project was developed as a landscape architecture internship final report in order to protect this heritage. **Methods:** The methodology applied consisted of four phases: The first phase [1 research] consisted of a bibliographical search of existing publications on the most pertinent topics, to obtain theoretical support for the proposal. In the second phase [2 analysis] the spatial information was analysed. Also, fieldwork made it possible to obtain essential details of the dynamics of the space. It was necessary to summarize this information in a third phase [3 synthesis], where the opportunities/constraints were defined. The final stage [4 proposal] consisted of developing the communication pieces of the project, proposed for the site. **Results:** The proposed landscape intervention aims to conserve the archaeological heritage while unifying the landscape and enhancing its multidisciplinary components. The space is redesigned as a balanced and harmonious landscape, formalizing functional spaces for the visitors and preserving the cultural heritage. The green structure enhances the ecological balance, promoting increased biodiversity and conservation of the typical “charneca” habitat, while applying strategies that seek to reduce the occurrence of forest fires. **Conclusions:** This project's main goal was to enhance the value of the cultural remains through the relationship between user and landscape. The presence of visitors is an active measure to safeguard the territory and promote the valorisation of this unique territory.

Keywords: Archaeological Structures, Cultural Heritage, Ecological Balance, Biodiversity, Conservation.

Acknowledgments

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Figure 1: View of the study area, where the largest cavities are located, integrated in the Underground Mining Complex (Photo by Mariana Veludo).



ARTS

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21376 | Flâneuse: On the possibility of a female equivalent to the flaneur

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Starting from the classic definition of the flâneur, a walker who walks aimlessly, observing the city and life in it, this research will question the gender privileges that make this figure possible and invisible in the crowd. The sexual division of labour and, consequently, of public and private spaces, make the walking woman a challenging figure. Through the writings of several authors, it is proven that this invisibility does not occur in the woman who walks, since she is the object of the male gaze, and sometimes, harassment; and that the design of cities does not favour their enjoyment by not taking their needs into account. This creates debate about whether the figure of the flâneuse can exist, since, although some authors consider that the circumstances for it do not exist; Others defend this figure, although considering that their experience and way of being in the world are different from those of their male counterparts. In this research, works by female artists from the end of the 19th century, the period in which the figure of the flâneur emerged, to the present are analysed. In the first case, the spaces painted by the impressionist women, represented by Morisot and Cassatt, are compared to their male contemporaries Manet and Degas. Differences in the type of space as well as in formal aspects of the composition have been found. In contemporary art, several women artists work on the action of walking and the female experience in the city from different disciplines, among which performance or action art stands out. Three of them were selected, and their actions are compared to Baudelaire's definition of flânerie. It was found that the presence of female bodies in the city has been regularized and limited in different ways from the 19th century to the present, so they did never have the freedom and unconcern of Baudelaire's flaneur. However, women have found their way to participate in urban space, as it is testified by their artistic work.

Keywords: Flânerie, Walking, Urban Space, Feminism, Female Experience.

21381 | The importance of sacredness in the construction of cemetery heritage, the case of Porto

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Until the 19th century, it was difficult to distinguish, in Portugal, the cemetery and the church, as burial spaces were often associated with the presence of a chapel or church¹. With the need to construct these 19th-century cemeteries due to the pandemics that reached the country in 1833 and 1855, the romantic cemetery emerged, which, full of symbols, began to develop its own art that reflected the cult of the dead, the evocation of memory and the eternity. In a more specific analysis of Porto's cemeteries, it is noticeable that the architectural characteristics are more prominent than the sculptural ones. It is through the work of artisans and the ornamental stonemasonry that Portuguese cemeteries became comparable to the best in Europe. The classification of the 19th century cemetery as heritage is relatively recent. The first international congress on contemporary cemeteries took place in Seville in 1992, and it was only in 2001 that the Association of Significant Cemeteries of Europe (ASCE) was established. From the 21st century onwards, there have been various promotions of visits to cemeteries in Porto, and two Portuguese cemeteries, Prado do Repouso and Agramonte, both in the city of Porto, are included in the European Route of the Most Significant Cemeteries². All these activities that are developed to enhance the maintenance of the cemetery space are still not sufficient to fill the gaps that this heritage suffers, although these gaps could be filled with some legislative reforms that establish protectionist rules, with concerns for safeguarding and restoration.

Keywords: Cemetery, Porto, Cemetery Heritage, Heritage Management.

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21389 | Between Positions and Oppositions: Aesthetic Decolonial Turn and the Choreography "21" by Grupo Corpo

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The Brazilian dance company Grupo Corpo has gained recognition for its longstanding existence and artistic work, notable for elements encapsulating the concept of "Brazilian-ness." Despite dance critics and scholars extensively documenting the presence of Brazilian cultural components in the company's history, there is limited exploration within humanities theories to explain or interpret these issues. This paper aims to correlate the aesthetic structure of the 1992 production "21" with decolonial theories. The analysis focuses on the scenic units and artistic ensemble, employing Maldonado-Torres' concept of the aesthetic decolonial turn as a framework [1]. The article discusses the redefinition of classical technique in the performance, where the dancers' questioning stance aligns with decolonial principles, avoiding cultural stereotyping and eliciting critical inquiries. The portrayal of Brazilian identity is non-stereotypical, seeking a dynamic identity for Brazil. Grupo Corpo challenges dualities like classical/contemporary, questioning the colonialist evolutionary logic. "21" serves as a historical milestone in Grupo Corpo's repertoire while providing a decolonial perspective on on-stage oppositions and tensions that may or may not find resolution.

Keywords: Decolonial Turn, Contemporary Dance, Decolonial Studies.

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21518 | From natural and human phenomena to plastic phenomena

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The research was premised on a highly sensorial plastic body of work, through aesthetic and contemplative experience. As the objective was to produce a work that could, in the confrontation with the spectators, result in a sublime experience, the study focused on one of Edmund Burke's works: "A Philosophical Investigation of the Origin of Our Ideas of the Sublime and the Beautiful" [1]. The philosopher created a kind of manual that identifies the characteristics of various bodies and, based on this analysis, made it possible to construct plastic bodies that are identified as manifestations of sublimity. As these manifestations come from phenomena, there was also a study on the phenomenological method and the contribution of authors such as Hegel, Husserl and Ponty. The Eastern philosophies: Wabi-Sabi and Emptiness, governed the production of plastic images, according to refined aesthetic criteria, guiding the choice of materials, colours and expression. A multidisciplinary work conceived, from a palette with natural pigments, non-consensual tools and various supports. These concepts were fundamental for them to result in an expression that referred to the pure, the raw, the perishable and, consequently, the spiritual. The work of art, or plastic phenomenon, is defined as the immanence of transcendence. It is intended to highlight the ability of art to stimulate the various senses and create objects that transcend the visual. This research culminated in the Project Report entitled: From Natural and Human Phenomena to Plastic Phenomena.

Keywords: Phenomenology, Aesthetic Experience, Sublime, Organic Matter, Plasticity.

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21625 | Investigations into the Intolerable Image: relationships and intersections between intolerable image, images of control and modernity/coloniality

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Background & Aim: The objective of this article is to investigate the tolerability of some images in today's society. The motivation for this research came from reading the text *The Intolerable Image*, 2014, by Jacques Rancière, as it was realized that some images are said to be intolerable in certain contexts, while others, which should be unacceptable, are being created and put into circulation. **Methods:** The tolerability of some images will be problematized based on the “Sanzala” coffee brand, existing in the city of Porto. For this analysis, the concept of Jaques Rancière will be crossed with other concepts also referring to the image, such as “images of control”, by Patricia Collins, and the “coloniality of seeing”, by Joaquín Barriendos. Finally, the permissiveness and tolerability of these images are analysed from the perspective of the modernity/coloniality regime based on raciality, a concept by Denise Ferreira da Silva. **Results:** From the articulation of the concepts of “images of control” and “coloniality of seeing”, it is possible to identify the origin of the tolerability of some images in society, specifically in Porto society, as belonging to the logic of the concept of developed modernity/coloniality by Aníbal Quijano. **Conclusions:** After reflecting on the images, it is clear that they hide dynamics of oppression and control, making them tolerable. Rancière's intolerable image could apply to different typologies, if they were observed from another perspective, under another reference.

Keywords: Intolerable Image, Images of Control, Coloniality of Seeing, Modernity/Coloniality, Raciality.

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Figure 01: Brazilian Coffee, image taken from the New Cooffe Company website. Source: <https://www.newcoffee.pt/pt/marcas/sanzala/>

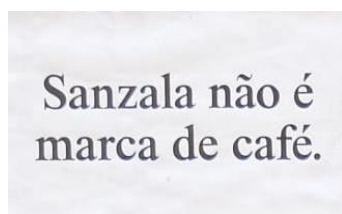


Figure 02: “Sanzala não é marca de café, 2022”, image of the work of artist Thiago Liberdade. Source: Artist's Personal Archive



Figure 03: Photograph of a coffee plantation in the Paraíba Valley, Brazil, 19th century, by Marc Ferrez, taken from the Instituto Moreira Sales website. Source: <https://ims.com.br/titular-colecao/marc-ferrez/>



Figure 04: “Todo o café, 2023”, image of the work of artist André Vargas. Source: <https://www.instagram.com/p/C177KrhJTLD/>

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Background & Aim: This work analyses the importance of empty space in Editorial Design, particularly in the communication of Landscape Architecture projects, with the Alameda de Cartes Park (PAC) serving as a case study. Starting from the premise that emptiness is not merely absence, but a crucial aesthetic element that shapes perception of form, as referred to in Gestalt Theory [1], this study proposes a new approach to the arrangement of texts and images in publications dedicated to Landscape Architecture. The investigation highlights how negative space can be strategically used to emphasize the visual and textual message, as mentioned by the author Alex White [2], promoting a more intuitive and engaging reading of landscape projects. **Methods:** In the absence of previous publications on PAC, it was important to look at the works of Landscape Architect Marc Trieb, such as "Doing Almost Nothing: The Landscape of George Descombes" [3], "The Shape of The Land" [4] and "The Donnel and Eckboo Gardens" [5]. In addition to these, a further thirty-seven books were consulted, of which thirteen were singled out for detailed analysis according to a set of defined parameters, such as empty space in the creation of rhythm, the strategy of visual hierarchy principles and the promotion of reading fluidity and legibility. Through the implementation of a modular grid, based on the author Josef Muller [6], and the adoption of a minimalist aesthetic, the project explores the dynamic between the filled and the empty, reflecting on how this relationship influences the interpretation of the content and the aesthetics of the book as a design object. This study also delves into a literature review of fundamental references in the field of Graphic Design, including theories and practices that emphasize the value of empty space in book layout, as Robin Williams [7] and Timothy Samara [8] point out. **Results:** The result of this study was applied to the development of a book that explores the PAC project, developed in the Landscape Architecture department of the Faculty of Sciences at the University of Porto, allowing to the general public learn about the history of the PAC and how it has changed the way those who live in it. **Conclusions:** In doing so, the project aims not only to highlight the importance of good design practices in environmental education and awareness, based on some SDGs, but also to explore the role of the Designer and Landscape Architect in creating spaces that promote reflection and engagement. Aimed at professionals, students and enthusiasts of Design and Landscape Architecture, this research contributes to a deeper understanding of how Editorial Design can

be used to amplify the social and environmental impact of landscape projects, highlighting empty space not just as a design component, but as an essential mediator in visual communication.

Keywords: Empty Space, Editorial Design, Landscape Architecture.

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Background & Aim: The digital era has profoundly transformed the field of academic publishing, as referred in the book “The Internet Encyclopedia: Volume 3 P-Z” [1] demanding not only the adaptation of content to the online environment but also the reinvention of graphic design practices to meet new demands for interactivity, accessibility and user feedback, as advocated by Paul Boag [2] and Ethan Marcotte [3], and explored by Catarina Rosária [4]. This study investigates the U.Porto Press's digital transition process and the 'Espaço Público/Public Space' journal, focusing on the development of design strategies that facilitate this transition while contributing to the United Nations' SDGs of sustainability, quality education and reduction of inequalities. **Methods:** This research highlights the challenges and opportunities of graphic design in digital academic contexts through a qualitative approach, analysing case studies (of the ninety-nine consulted, eighteen were selected for detailed analysis), with a visual approach looking for patterns in the examples collected – according to following parameters: Navigability and Organizational Structure, performance, legibility and accessibility; Legibility and Typography; Visual Identity and the quality of the Aesthetic Dimension – and an applied approach, using the theory and design processes adopted, in this project, to formulate conclusions. **Results:** Particular attention is given to the creation of a bilingual logo for the journal, representing an innovative case study of visual identity in multilingual academic publications. Furthermore, the implementation of a digital platform for U.Porto Press brings the challenge of creating a website, divided into two areas, that simultaneously provides open access books and supports the publication of interactive and multimedia content. This platform represents a significant milestone in the transition to digital access, promoting the dissemination of reliable knowledge. **Conclusions:** This study contributes to the understanding of the role of graphic design in the academic digital transition, offering valuable insights for publishers, designers, and academics involved in the digitization process, while addressing the essential differences between digital and paper publications in the academic field, and evidencing the pioneering role of U.Porto Press and the 'Espaço Público/Public Space' journal in this context.

Keywords: Academic Press, Website, Digital Editorial Design, Logotype.

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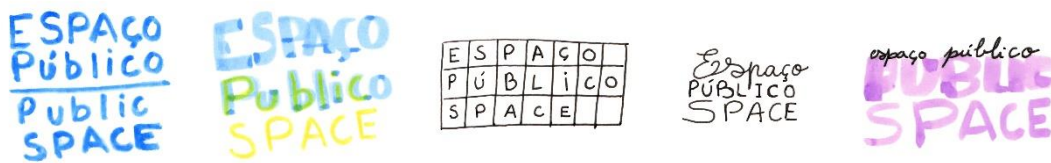


Figure 1: First compositional sketches for the journal's logo



Figure 2: New compositional sketches, taking into account the restriction, communicated in the meantime, of the inclusion of the acronym

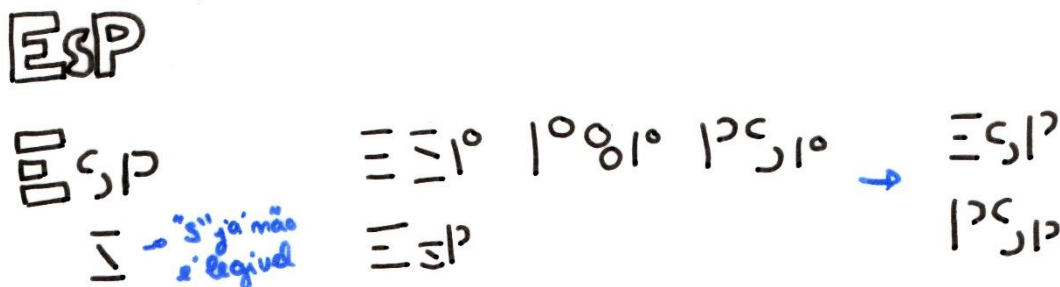


Figure 3: Sketches resulting from the attempt to create a dynamic in the acronym, testing the simplest way to maintain its legibility

Espaço Público
Public Space

Espaço
Público
Public
Space

Figure 4: First version of the logo (expanded and condensed), presented to the editorial team of the journal for approval

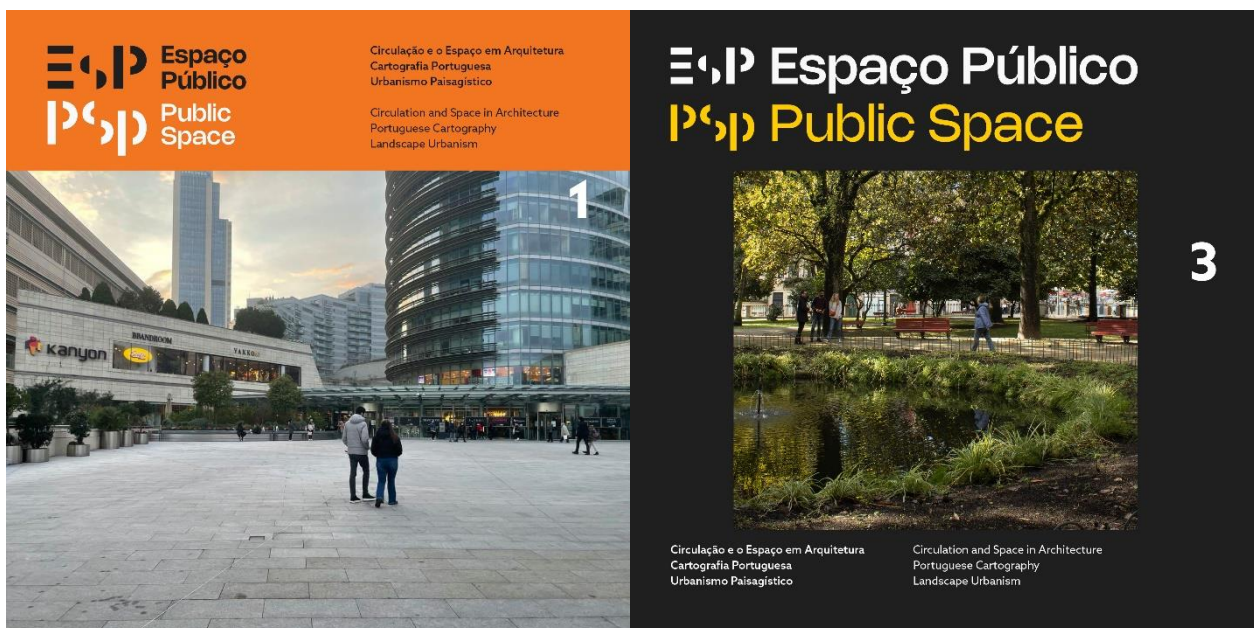


Figure 5: Final version of the logo, condensed and expanded, used in the context of possible journal 'covers, more details about the graphic project in <https://www.up.pt/revistas/index.php/rep/index>

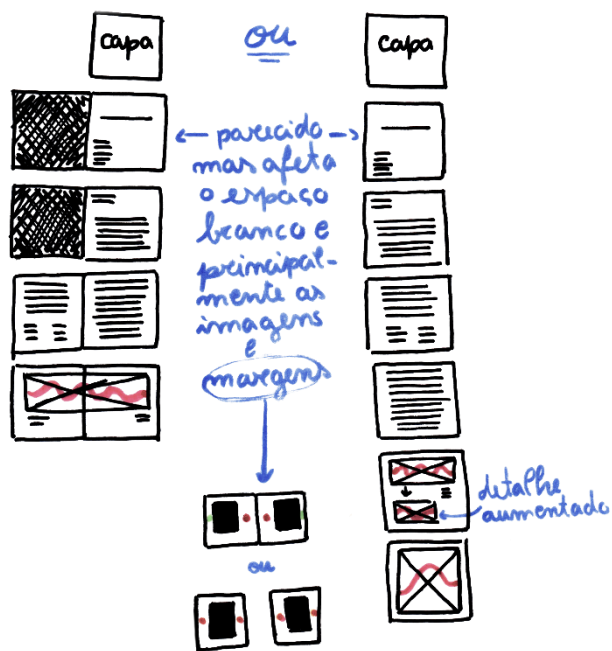


Figure 6: Sketch exploring the practical differences between the layout of a printed book (double page) and a pdf (single page)

21782 | Systematization of Metaphor as a Creation Tool

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Background & Aim: Acknowledging metaphor as a powerful tool that helps to comprehend abstract or intangible notions, whose representation and partial understanding would be unfeasible without the use of association and similarity techniques, it is claimed that by analyzing the great potential of this resource — which goes beyond what is ordinarily acknowledged in the linguistics fields — it has become possible to understand a wide range of experiences or nebulous concepts that arise in a subject's daily existence, such as: emotions; feelings; moral values; (...). Therefore, the main motif for this research is the development of a system that translates the qualities and abilities of the metaphor as a visual aid to depict these ideas, making use of more familiar vocabulary to understand such complexities, also enabling their application in the artistic field. **Methods:** The framework employed in this study condenses a route of filtration and research that explores the intrinsic notions, history, and nature of this resource, as well as its adaptability in several linguistic-cognitive domains, with such findings and claims always backed by the opinions of the most well-known experts, as well as artists whose projects address concerns related to the topic, namely Michael Cheval and Vladimir Kush. **Results:** As a result, the acquired translation system is mainly conceptualized on using symbols, which are believed to be true conveyors of meaning, thanks to their connotative and denotative functions. **Conclusions:** Consequently, "Cosmic Fisherman" and "The Path of Souls" materialize, respectively, notions as nebulous and evasive as those of "conquest" or "imagination," acting as examples that validate the declaration that the metaphor should be characterized not only as a mental activity, but also as a product of that same action, capable of embodying these abstract aspects in an individual universe, linking the spheres of objectivity and subjectivity, allowing the subject's physical and spiritual growth.

Keywords: Abstract Concept, Metaphorical Concept, Metaphor, Symbolic Transformation.

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Figure 1: Artwork by Jorge Cruz [“Cosmic Fisherman” (2023) and “The Path of Souls” (2022)]

21793 | Undressing the Body: Ecdysis and Metamorphosis as Memory for Body

Reconstruction

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In recent years, the term "ecdysis" has become central in contemporary art for authors such as Rui Chafes (1966 -) [1], Anna Barriball (1972 -) [2] and Berlinde de Bruyckere (1964 -) [3]. Through their respective approaches, these artists explore themes of renewal, transformation, and the cyclical nature of existence. Originating from science, ecdysis ["process whereby the exoskeleton is shed periodically, allowing for the animal's growth"[4]] describes how arthropods, such as insects and crustaceans, shed their outer layers, leaving behind exoskeleton, to what Alfred Gell refers as exuviae [5], defining it as remnants of past rituals that retain the energy or presence of absent individuals through touch. This art research aims to address, in an interdisciplinary manner, the symbiotic relationship between ecdysis and exuviae, illuminating the profound interplay of renewal, transformation, and transience evident in both scientific exploration and artistic expression. Theoretical issues related to memory, such as forgetting, mourning, stages of growth, transformation, and metamorphosis, are theoretically explored by authors including Marc Augé [6], Merleau-Ponty [7], and Thomas Mann [8]. For this purpose, technical-practical research is developed using frottage, a transfer process through direct action on surfaces by pressure exerted by the body itself. The resulting layers, akin to exuviae, reflect the physical relationship with objects, buildings, and places, from the personal and familiar context, in a process of both graphic and phenomenological, but mainly self-awareness about the family memory. This research focuses on the reciprocity of human touch in the friction process, the materiality of graphite, and transparency as a revelation of hidden layers and information, where drawing is an important process for the project. Considering the relevance of the touch, in Merleau-Ponty phenomenology [7] is crucial to establish a direct connection between the body and the object, where touch acts as resistance to forgetting and to build new physical memories. This process is intended to access the reconstruction of the body, as a matter of memory and physical experiences. My research endeavors, particularly through my artistic practice, aspire to serve as a framework for contemplating ecdysis within the context of metamorphosis, fragmentation, skin, and memory. By integrating elements from visual arts, biology, and psychology, it offers personal and renewal perspectives on these concepts. Through the frottage over family objects and spaces, I aim to establish emotional and physical connections with them,

echoing Merleau-Ponty's notion of tactile bonds. As memories could be reconstructed through tactile experiences, the question of identity arises, leading to an exploration of the intertwined identities and history of the body.

Keywords: Ecdysis, Exoskeleton, Memory, Metamorphosis, Art Research.

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European project MID - Mirror Identity Drawings, integrated in the Unesco Chair - Arts and Culture Management, Cities and Creativity

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21798 | Exploring the Relationship Between the Depressive Position, Memory, and the Creative Impulse: A Kleinian Perspective on Art

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Background & Aim: While Klein introduced the concept of the depressive position (1935) to understand the psychic development of children, Hanna Segal expanded its scope by associating it with the essence of aesthetic creation (1947). Unlike Sigmund Freud's approach (1910), which emphasizes the content of artworks, the Kleinian perspective delves into the impulse driving the creative process. This study aims to elucidate how memory can serve as a bridge between the depressive position and the creative impulse, transcending the analysis of specific content within the artwork. **Methods:** Based on Kleinian theory, this study analyzes the formal aspects that connect the two territories. By analyzing formal elements such as composition and narrative structure in artistic works, including my own and those of other authors, this approach emphasizes understanding the underlying motivations behind artistic expression, unveiling how the dynamic structure of the depressive position unfolds in two distinct moments and influences the creative process: first, by recognition, and then by reconciliation. **Results:** This analysis presents the formal aspects of memory, which bear resemblance to those observed in the depressive position. Understanding how these processes manifest artistically allows us to grasp that the dynamic biphasic structure of the depressive position directly impacts the structure of the creative process. Regardless of the specific content of the depressive position or the memory, this process can be recognized in my own work and that of other artists such as Kaufmann or Kollwitz. **Conclusions:** Understanding the role of memory in this process deepens our comprehension of the relationship between the depressive position and creative impulse. By using memory as a bridge between the two territories, the artist can have a better understanding of his motivations, resulting in artistic work capable of reflecting those impulses, rather than focusing on the representation of specific content.

Keywords: Memory, Depressive Position, Creative Impulse.

Acknowledgments

Prof. Dr. Domingos Loureiro

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21853 | On taking time with the world

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This investigation starts from the phenomenological principle that man perceives himself by perceiving what is outside himself, what is outside his body — the world — in an intimate and active experience between being and the world: being-in-the-world. Martin Heidegger appears as a central figure for understanding this issue, not only because he introduces us to this concept of phenomenal origin in itself, which is being-in-the-world, but mainly because he develops all his writing driven by a need for ontological origin. This study articulates the presented concept with the essay *Constructing, inhabiting, thinking* [1] by the same author, allowing us to understand the way in which the act of painting acts as promoters of a profound understanding of existence; and with the practices of Fernando Lanhas [2] and Eduardo Chillida [3], which are very pertinent in the context of this research because they privilege the experience with the world as an essential other for the creation of the work as a thought about the relationship between being and the world which, in turn, allows the encounter with oneself. Understanding this is crucial to this study because they form the basis for the design, execution and subsequent study of a practical case study that was carried out in the context of an Artist Residency on the Island of São Miguel, where we set out to think about some personal concerns in relation to the natural territory: the deep ocean and the interior of the volcano. In this regard, through the presentation of the project carried in São Miguel, we will deepen our understanding of this matter between being and the world, as well as the importance of Painting in this intensive dive into the natural world, and the search for an understanding of the most original relationship between being and the world that powers all of life. And above all, in the realisation that inhabiting, this pure manifestation of being, is about “taking time with the things of the world” (2002, P. 131) [4], and not acting over the things of the world.

Keywords: Being-In-The-World, Inhabiting, Body, Space, Artistic Practice.

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21859 | Learning and understanding painting through direct contact with works of art: presentation of the case study carried out with the work ‘Casas Brancas de Capri’ by Henrique Pousão

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This academic summary addresses the importance of direct contact with works of art, particularly painting, as a means of learning and understanding. Until the end of the 19th century, art museums played the role of school museums, with examples such as the Louvre in Paris, the Royal Academy in London and the Prado in Madrid. In Portugal, the Soares dos Reis Museum and the Chiado National Museum were frequented by art academies, allowing students, especially in painting, drawing and sculpture, to learn directly from the collections. The practice of painting directly from the works exhibited in the museums provided in-depth knowledge of the techniques and processes used by the artists, allowing for a detailed understanding of each author's choices. However, in recent decades, this practice has diminished, focussing more on drawing and art history. This study proposes to revive this approach, using the work ‘Casas Brancas de Capri’ by Henrique Pousão, belonging to the Soares dos Reis National Museum, as a case study. The paper discusses the processes involved in practical learning with Pousão's work, highlighting the results of the research. It also seeks to promote reflection on the author's work and its relevance to the history of art and the Porto Academy of Fine Arts.

Keywords: Henrique Pousão, “Casas Brancas De Capri”, Painting, School Museum, Master Copy.

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Figure 1-Araújo L. F. (2023). The specific museum scenery that was made to be painted from the original. Museu Nacional Soares dos Reis, Porto, Portugal.

21940 | The Ruins of Hubert Robert: The Viewpoint of the Artist in Face of Contemporary Events

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The contemplation of ruins has been a topic of discussion in the fields of philosophy, art, and literature throughout the history of humanity, but to a greater extent in the last four centuries. The “passion of ruins” stood out particularly in the European artistic movements of the 18th and 19th centuries, having greatly influenced the artists of the time. In the painting *Vue de la Grande Galerie du Louvre en Ruine* (1796), Hubert Robert presents the imaginary future vision of the great gallery of the Louvre Museum in ruins. Considering the turmoil that France was experiencing at the time, Robert's painting reflects the historic events which surrounded him. Ruins, for Robert, are a projection into a probable future based on an uncertain present. The first part of this article addresses how his paintings demonstrate a concern on the part of the artist regarding current events and the notion of his role as an active witness in them, with ruins being his main instrument for expressing these issues. An analysis of Robert's works shall be made from the perspective of Denis Diderot, his contemporary and witness to their conception, and of the archaeologist Alain Schnapp, current researcher of the importance of the past and ruins in contemporary society. As well as a further dive into the contemporary art world by establishing a parallel with the work of the German artist Anselm Kiefer, whose *oeuvre* consists in a constant draw back to the events of the second world war and the role of his compatriots in its development. The second part of this investigation will expose how these concerns found in previous artists' works are reflected in the studio practice of this author in the last two years of their master's studies, culminating in a contemporary understanding of the role of ruins in current artistic practices.

Keywords: Anselm Kiefer, History Painting, Hubert Robert, Ruins, Landscape Painting.

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22078 | Existential Absurdity as a Concept in Painting: An Introduction

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The presentation in question emerges as an introduction to a master's research that seeks to highlight existential absurdity as a conceptual resource in the pictorial and figurative context of contemporary artistic practice. For a more refined theoretical understanding and considering the literary and philosophical origin of the concept, a brief explanation of its semantic and etymological condition is first introduced. Secondly, the established connection with the existentialist philosophical context is highlighted, which during the 19th and 20th centuries promoted extensive theorization about existence. Existential absurdity is thus presented as an abstract manifestation of the confrontation between humanity and the contradictory and enigmatic quality of existence and the world. This reflection is mainly grounded in the thought of Albert Camus (1913-1960), a seminal philosopher in the theoretical debate about the feeling of absurdity, who considered the latter as a divorce between the expectations of the human subject for meaning and the indifferent reality offered by the world. Alongside the theoretical component, is presented a visual analysis of paintings of my own, done for this research, and others by the artist Michaël Borremans. These are asserted here as introductory evidence of pictorial expression that visually explores existential absurdity through dissonant elements; ambiguous narratives; blending reality with fiction and memories with the experience of the present. In parallel, reference is made to the Theater of the Absurd because, although it's an artistic manifestation of the past and does not belong to the pictorial context, it reveals characteristics that enhance visual constructions about this absurdity in the field of the visual arts. Therefore, by connecting the theoretical principles mentioned with these visual approaches, this research contributes to and encourages a deeper and more meaningful study of the role of existential absurdity in contemporary artistic discourse.

Keywords: Existential Absurdity, Existentialism, Albert Camus, Figurative Painting, Theatre of The Absurd.

22104 | Accessibility and Street Art: Art Curation in Urban Spaces for the Visually Impaired

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Through many positions and discussions, the current definition of museum is clear in its role within diverse local communities as a tool for inclusive education, leisure, and cultural development (Belting, 2006: 6). Representation, identity and accessibility have become focal points for the way institutions build their activities, programs and attract audiences. As cultural and artistic manifestation extend beyond museum walls, interaction with local audiences becomes a daily pursuit. The research and curatorial project developed as part of the Master's internship in Galeria de Arte Urbana (CML), aims to understand how urban artistic and cultural manifestations can become more accessible. It concerns the creation of a contemporary street mural for the blind and visually impaired. "Building accessibility" often becomes purely functional — ramps or tactile pavement, while important and necessary, address only bare minimum requirements for the participation of disabled people in everyday life. As such, it was mandatory to develop a relationship with blind individuals and accessibility professionals, taking their experiences into account for the design of the mural. Through the development of the project, I have tried to guide the artists to meet our public's needs, from choosing materials to developing effective artistic mechanisms for tactile experience and even searching for an easily accessible location. The research methodology for the project was based on documentary analysis and interviews. The former favored the analysis of theoretical and research projects, providing data on previous activities, exhibitions, design and communication, while the latter allows cross-reference with the perception of other professionals and disabled people, to address missing elements and better the experience. Although the project is still under way, there's confidence it could have positive impact for accessible curatorial practices. This could raise awareness and enable change within cultural institutions, establishing dialogue with marginalized community members.

Keywords: Accessibility, Street Art, Art Curation, Visual Impairment.

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22110 | The Future in my twenties

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Background & Aim: Contemporary art often revolves around the future, focusing on anticipation and exploring the societal impacts of technological and scientific progress. This study shifts this focus to the individual and emotional realm to understand the collective future. It creatively portrays people's expectations, fantasies, fears, and aspirations regarding the future from anthropological and emotional perspectives. **Methods:** To establish this research, references were drawn from the works of modern philosophers such as Zigmunt Bauman or Marina Garcés, design-related books like "Speculative Everything," and various literary works including "Los Años" by Annie Hernaux or "Cien Años de Soledad" by García Márquez, among others. Additionally, a series of visual artists, including Mariko Mori, Gerard Richter, and Bleda y Rosa, were instrumental in concretizing and shaping the ideas extracted from the readings. **Results:** The results are reflected in an essay that analyzes the array of perspectives gathered and establishes a critical vision primarily from a generational standpoint with an objective or aspirational nature, followed by an individual perspective with a more personal nuance. This essay is accompanied by a sculptural piece in the form of a diptych, consisting of two pieces made of transparent plastic material that speaks to two opposing visions of the future, one optimistic and the other pessimistic. The title of this diptych is the same of this research, *The Future in my twenties*, Oporto 2024, by Juncal Alma. Each piece is labeled [1] for the expanded left piece and [2] for the compressed right piece. **Conclusions:** This ongoing research opens the door to further exploration, aiming to reflect the diversity of situations and emotional conflicts arising from our relationship with the passage of time. The goal is to enhance and deepen our understanding of this relationship, continuously seeking improvement.

Keywords: Future, Individual, Emotional, Collective.

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Figure 1 - The Future in my twenties [1],[2] Oporto 2024 Plastic polymer Juncal Alma

22121 | From collection to creation

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In my artistic approach, repetition intertwines with modern art, contrasting the classical, which had a spatial and timeless conception. This new paradigm introduces temporality and acquires symbolic value that exemplifies contemporary reality, perceived as a sequence of events and expectations. My purpose is to emphasize the importance of sequence and plurality when tackling projects. I draw inspiration from everyday, repetitive actions and elements. So far, I have achieved sculptural results that I wish to continue exploring, blending them with audiovisual elements. Artists like Mark Dion and Pierric Sorin are important references in my work. Ultimately, I aim to create art that resonates with everyday life, where the concepts I address are infused with the reality that surrounds us. This approach seeks to capture the essence of daily life in artistic expression.

Keywords: Archive, Repetition, Series, Temporality.

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22129 | Van Gogh – The Painter of Sunflowers

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Background & Aim: The primary focus of our research was on exploring Vincent van Gogh's figure due to his stature as a great artist globally and his distinguishing techniques, particularly his prowess as a colorist. As Van Gogh wanted to be known as the Painter of Sunflowers, we narrowed our study to that specific phase – The Sunflower Phase. This phase encompasses two series: the Sunflowers of Paris and the Sunflowers of Arles as well as their Repetitions, and a triptych, painted from 1887 to 1889. **Methods:** We conducted a comprehensive survey of van Gogh's works within this period using online platforms like the Van Gogh Museum and published materials. Opting for a thematic analysis over individual scrutiny, we highlighted each drawing's unique contribution to the collective narrative. This decision was based on our belief that works from this chronology collectively convey the artist's inner state, making a collective analysis more meaningful. The study explores how two distinct series, although representing the same flower, are remarkably different due to the artist's emotional influences and the desire for acknowledgment from Gauguin during the creation of The Sunflowers of Arles³. **Results:** The study contextualizes the artist's motivation and thoroughly traces Van Gogh's artistic growth, focusing on the sunflower as a central element. This provides a preliminary comprehension of its anticipated influence on the state of the art, laying the foundation for a greater exploration of Van Gogh's Sunflowers. Insights into the artist's motivations, techniques, and their potential impact on the broader artistic landscape are also presented. **Conclusions:** The study concludes with insights into Van Gogh's profound emotional connection to the sunflower motif, his desire for a distinctive identifying element⁴, and wanting to stray from Impressionism⁵. This exploration

³ Information found in the letters sent to his brother Theo, “*Now that I hope to live with Gauguin in a studio of our own. I want to make big decorations for this studio. Nothing but big sunflowers.*” POMERANS, Arnold (1997). The Letters of Vincent van Gogh. Letter 666 To Theo van Gogh. Arles, Tuesday, 21 or Wednesday, 22 August 1888.

⁴ Information found in the letters sent to his brother Theo, “*... that — ... that's... the flower'. You know that Jeannin has the peony, Quost has the hollyhock, but I have the sunflower, in a way.*” POMERANS, Arnold (1997). The Letters of Vincent van Gogh, Letter 741, To Theo van Gogh. Arles, Tuesday, 22 January 1889.

⁵ Van Gogh had told his brother he was starting to look for “*a simple technique that perhaps isn't Impressionist.*”, striving to create his own personal style, further adding, “*I'd like to paint in such a way that... everyone who has eyes could understand it.*” POMERANS, Arnold (1997). The Letters of Vincent van Gogh. 666 To Theo van Gogh. Arles, Tuesday, 21 or Wednesday, 22 August 1888.

contributes to a nuanced comprehension of the artist's motivations and artistic evolution during the Sunflowers phase.

Keywords: Vincent Van Gogh, Sunflowers, Impressionism, Post-Impressionism.

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21617 | Reflection about the framework for cultural heritage restitution policies: a case study of the Mesoamerican treasures of MHNC-UP

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Nowadays, terms such as «Restitution» and «Repatriation» of art works are related to the concept of «Decolonization» in so far as many of the studies relating to ethnology, anthropology and archaeology focused on objects and artifacts from former colonies and understood with a western mindset. Accordingly, this essay aims to summarize the evolution of repatriation policies carried out by influential international organizations such as ICOM (International Council of Museums) and UNESCO, interconnected with the pre-Columbian collection - particularly from the United Mexican States - at the Museum of Natural History and Science of the University of Porto (MHNC-UP). Although the information on the archaeological exploitation of the artifacts is quite scarce, this essay will start with a diachronic narrative of the trajectory of the pieces that was produced from the 19th century to the present day based on 2019/2020 “Cultures and Geographies” catalogue. Subsequently its important to mention the main conventions related to the illicit trafficking of Cultural Heritage, taking as a starting point the 1970’s UNESCO Convention, which came into force in 1972. It’s also important to mention a document drawn up by ICOM: the Code of Ethics for Museums (1986). These regulations show how the definition of the term Museum has evolved over the years, with its latest redefinition stipulated at the ICOM General Conference in Prague in 2022. This article will also analyse the 2005 Faro Convention in order to demonstrate the concern for the inclusion of new discourses on cultural heritage. These regulations are relevant to briefly analyse in order of emergence some aspects that are important for the international community and the protection of Cultural Heritage. In this sense, two fundamental questions will be problematized: can we apply the current regulations on heritage restitution to the MHNC-UP’s collection of pre-Columbian artifacts? In what way?

Keywords: Repatriation, Restitution, Decolonization, United Mexican States.

21563 | Journal of the Invisible: a chronicle about illness and disability as motivators of the artistic process

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Background & Aim: The research is exploratory in nature and centered around self-referential experiences linked to Ehlers-Danlos syndrome. It emphasizes the critical framework surrounding a woman's life with an invisible and fluctuating disability, which informs artistic expression through diaristic and performative dimensions. The research seeks to examine the impact of chronic illnesses, syndromes, or disabilities on artists' lives and creative processes. Additionally, it aims to bring visibility to artistic practices originating from bodies that deviate from societal norms, particularly focusing on disability within the historical context of art, including movements such as Crip Art. **Methods:** The research uses a practical and theoretical approach, based upon a bibliographical review, and interviews conducted with artists in production who experience disability in different ways: Nazareth Pacheco, Estela Lapponi, Diana Niepce and Anajara Amarante. **Results:** The research produces a combination of research and authorial work, within the realm of a multifaceted project that will result in artistic and scientific production, an exhibition and scientific-artistic communications. **Conclusions:** The study provides insight into how individuals with Ehlers-Danlos and related illnesses navigate artistic practice. It highlights the significance of recognizing and comprehending the effects of chronic illnesses and disabilities on artists and their creative output. Additionally, it underscores the importance of integrating a range of perspectives, particularly those of artists with disabilities, into discussions surrounding art and disability.

Keywords: Journal, Illness, Disability, Doubt, (In)Visibility.

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ASTRONOMY

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21674 | Potential Field Source Surface Extrapolation Constrained by Coronal Observations

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Background & Aim: The solar magnetic field is responsible for phenomena like the dazzling arch-like structures, such as the prominences and coronal loops, or even the large expulsions of plasma called coronal mass ejections (CMEs) with possible impact on Earth. A description of the coronal magnetic field is required to understand these solar phenomena as well as other intriguing solar physics processes, such as coronal heating and plasma acceleration. As the current instruments cannot measure the coronal magnetic field, other methods must be used. Extrapolation techniques like the efficient Potential Field Source Surface (PFSS) method are often employed, which requires only the available photospheric magnetic field vector measurements as a lower boundary and extrapolates them into coronal layers. This project aims to improve the PFSS model by adding a new term that allows us to better constrain and improve the PFSS extrapolation by considering the 3D geometry of coronal loops obtained by coronal observations. **Methods:** We developed a first-order finite differences algorithm for the mentioned goal, implementing an optimization approach. This optimization involves minimizing a path integral along coronal loops, which is the new term, while assuring the whole coronal magnetic field remains divergence-free. **Results:** The information on this 3D geometry of coronal loops was successfully incorporated into the optimization output magnetic field, which led to a decrease in the angle between the tangents to the coronal loops and the magnetic field. Such a procedure imprinted the geometric shape of coronal loops from synthetic observations on the coronal magnetic field. **Conclusions:** The optimization procedure developed allows us to have a more reliable representation of the global structure of the corona at a given instant of time than that of a simple potential field corona, while PFSS computational efficiency is preserved.

Keywords: Magnetic Field, Corona, Extrapolation, PFSS.

22089 | Looking for new stellar activity proxies using HELIOS data: towards other

Earths

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Background & Aim: Signals of stellar origin related to magnetic features in the surface of solar-type stars are one of the biggest challenges for the detection and characterization of other Earths. In particular, this “noise” produces variations in the observed spectral line profiles and positions that are used to measure the stellar Doppler shifts used to infer the presence of other worlds using the radial velocity method. In this talk I will present our project to explore a spectroscopic dataset of the Sun. **Methods:** We used radial velocities (RV's) for the Sun as measured using high resolution spectra from the HELIOS/HARPS-N solar telescope/spectrograph. We then use the code ACTIN¹ to calculate different stellar magnetic activity indices from the same spectra. Using the images of the SDO² space mission we finally calculated the integrated unsigned magnetic field strength ($|B|$), the faculae and the sunspot's coverage of the solar disk. Using the derived values (we used a pipeline in Python, SolAster³), we inspected the correlations between the activity index, radial velocities, and magnetic parameters by means of a simpler linear fit. Next, we tried to create linear models to reproduce the RV's variation using the spectral lines more correlated with the RV's and trying to combine parameters, in order to determine which of them is more correlated with sunspots and which is more correlated other with faculae. The full idea is to understand the connection between the different activity indices and the magnetic phenomena happening in the solar disk, as well as how we can use these to correct for the stellar "noise" in Doppler radial velocity data. **Results:** We conclude that the $\text{CaII}_{\text{H\&K}}$, CaII_{H} , and the CaII_{K} are the lines that most correlate with the RV's, with a Pearson's correlation coefficient of 0.84, 0.82, and 0.82, respectively. Considering the magnetic elements, the CaII lines have a strong correlation with the faculae and the $|B|$. Meanwhile, the $\text{H}\alpha_{1.6}$ correlates more with the sunspots. Using a linear model with the $\text{CaII}_{\text{H\&K}}$ line to correct the stellar "noise", we reduced the standard deviation of the radial velocities from 1.89 m/s to 1.05 m/s. This is very good because we almost had a similar result just with the integrated unsigned magnetic field strength. Using combined models, we have for the residuals of the $\text{CaII}_{\text{H\&K}} + \text{H}\alpha_{1.6}$ and the $|B| + \text{H}\alpha_{1.6}$ values of 1.03 m/s, and 0.77 m/s, respectively. We can have an opportunity to reduce significantly the noise with a combination of indices that are sensitive to sunspot and faculae.

Conclusions: The $\text{CaII}_{\text{H\&K}}$ line gives impressive results because the value of the standard deviation of the residuals is remarkably similar when we used just $|B|$ (gives a 0.92 m/s value). Combining models can lead to a way to improve our reproduction of the RV's variations. We can see it by using $|B| + H_{\alpha_{1.6}}$ that we had a much better performance, considerably reducing the standard deviation of residuals. In the future we can try to obtain new indices that are more sensitive to sunspots (with a higher Pearson correlation coefficient) and combining them with faculae can lead us to better results in correcting the stellar "noise".

Keywords: Techniques: Radial Velocities – Sun: Activity, Sun: Faculae, Plages.

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21848 | Oscillations in cool-dwarf stars through the spectrograph ESPRESSO

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Background & Aim: Asteroseismology is the study of oscillations in stars, periodic perturbations that propagate through a star, offering one of the best ways to directly probe a star's inner structure and improve measurement of global properties of a star such as its mass, age and radius. The number of stars in which oscillations were detected has increased rapidly in recent years [1], although these detections have been limited to particular types of stars, mainly main-sequence stars at least as hot and massive as the Sun as well as red-giant stars [2]. Our work goes beyond this frontier by being centered on ϵ Indi, the coldest star in which asteroseismic oscillations have been detected [3]. Besides aiming to study this newly available observational data, we will also investigate the issues with current stellar models focusing on the surface term, a systematic error between the frequencies of oscillation in models and observations, caused by improper modelling of the stellar atmosphere and convection [4]. **Methods:** We use advanced stellar modelling software to model the evolution of stars with properties close to ϵ Indi [5] along with their asteroseismic oscillations [6]. Then we use model optimization procedures [7] to discover the best fitting model and from there derive properties of ϵ Indi and limitations of the models. **Results:** We have created a grid of about 2000 stellar models, in which we vary the mass, fraction of metals and strength of convection in the model. Through data visualization and analysis, we have studied how the asteroseismic properties, the inner structure and global stellar attributes of the models are correlated with the parameters of the grid. **Conclusions:** We have confirmed that our grid accurately models the expected properties of cool-dwarf stars, and that ϵ Indi is within the range of stars encompassed by it. In the future we will use them for obtaining more precise values for the mass and age of ϵ Indi, along with determining the surface term and its ideal correction method.

Keywords: Asteroseismology, Cool Dwarf Stars, Surface Term, Stellar Modelling.

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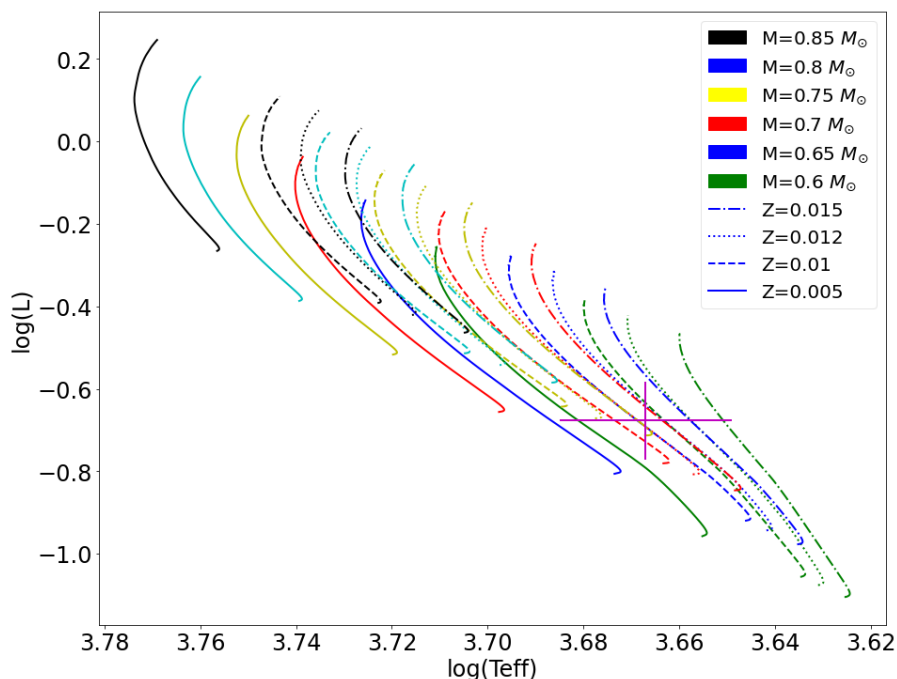


Figure 1: HR diagram plotting the common logarithm of the effective temperature, the temperature on the surface of the star, versus the common logarithm of the luminosity along the star's evolution in the main sequence. Each colour represents a different value for the initial mass and each type of line a different initial mass fraction of “metals”, elements different from Hydrogen and Helium in the star. The cross represents the current values for ϵ Indi, along with their uncertainty.

21592 | Probing the interior of Subdwarf B stars with asteroseismology

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Background & Aim: One of the unknowns faced when modelling stellar evolution concerns the extent of the mixing of chemical elements in the stellar cores. This chemical mixing influences the time stars spend on each given phase along their evolution, an information that is important in astrophysics. The space-based data collected by the NASA Kepler satellite provided the means for a direct probe of the cores of evolved stars. This is enabled by the monitoring of the small vibrations exhibited by stars through a technique named Asteroseismology. **Methods:** Cunha et al (2019) developed an asymptotic formulation to describe the frequencies of the oscillations observed in evolved stars. Here we apply this formulation to real data to infer on the extent of chemical mixing in a class of helium-core burning stars known as subdwarf B stars (sdBs). To this end a python code was developed using Dynamic Nested Sampling to obtain the best fit model, compare it with the observed data, and determine the parameters that describe the position of the rapid structural variation that takes place at the edge of the convective core. Three stars were used in the model-data comparison. **Results:** For all three stars we found that the position of the rapid structural variation indicates a convective core larger than the convective cores inferred in red-giant stars. This brings into question the usually accepted argument that sdBs are red-giants that had their outer layers stripped out due to an unknown physical phenomenon. We also found that the data for different stars are best fitted with structural variations of different shape indicating that the details of the physical processes leading to establishing the structural variations may be different according to the star. **Conclusions:** Characterizing the core structural variations may provide information on the separation between the border of the convective core and the convective shells. This model-independent result may be used to put to test structure models of sdB stars.

Keywords: Subdwarfs, Stars, Star's Interiors, Oscillations.

Acknowledgments

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21593 | Measuring the curvature of the universe with the redshift drift

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Unlike other observations, the redshift drift of celestial objects following the Hubble-Lemaître flow is model-independent, offering a probe of the standard cosmological paradigm as well as a further method for constraining the parameters of various cosmological models. By comparing the past light cones of different objects, one can effectively watch the expansion of the universe in real time, although there are various practical challenges. In preparation for the measurements by the ANDES spectrograph at the ELT [1] and by the SKA, we studied the sensitivity of the redshift drift to the curvature parameter, which is assumed to vanish in most previous analyses. Using Fisher Matrix Analysis techniques, we show that the sensitivity of redshift drift measurements to this parameter is smaller than that for the matter density but larger than that for dark energy parameters. Our analysis provides forecasts for the performance of these facilities, but also enables the selection of optimal samples for these measurements.

Keywords: Cosmology, Redshift Drift, Fisher Matrix Forecasts, ELT/ANDES, SKA.

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21627 | Updated constraints on Regge-Teitelboim gravity

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In the Stern & Xu extension of the Regge-Teitelboim model [1], gravity is described by embedding the space-time manifold in a fixed non-flat higher-dimensional background, where the embedding coordinates, rather than the metric tensor, are the dynamical degrees of freedom. Previously, we have constrained this model using low-redshift (background cosmology) observations [2]. Here we extend that work to a full analysis incorporating high-redshift data, including the cosmic microwave background. We have developed a modified version of the CLASS software [3] including the Regge-Teitelboim fluid. The fluid's impact on background cosmology is computed by integrating the model equations to obtain the density of the Regge-Teitelboim fluid. The likelihood analysis is done by sampling Monte Carlo Markov Chains (MCMC) with the MontePython code [4] directly coupled to the modified CLASS code. The addition of the Planck dataset [5] strongly constrains the Regge-Teitelboim fluid density, leading to an upper limit for it. These constraints are much stronger than those in our previous analysis using the low-redshift data. The overall conclusion is that the modified Stern & Xu model is constrained to be consistent with the Λ CDM model, in the sense that any deviations from it (in the form of a Regge-Teitelboim type fluid) are constrained to be very small.

Keywords: Cosmology, Dark Energy, Regge-Teitelboim Model.

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BIOLOGICAL SCIENCES

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21377 | Evaluation of the “Bubble Barrier” technology on the ecological quality of the Ave Estuary

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Background & Aim: The current increasing production of plastic is a serious hazard to every ecosystem on Earth, mainly because of its long-life span and artificial nature. Many efforts are being made to reduce this environmental threat. The MAELSTROM project (H2020, www.maelstrom-h2020.eu/) seeks to attain answers and technologies to prevent the transport of plastics from rivers to sea. The bubble barrier (BB) is a technological tool that intercepts the litter (e.g. plastics) in the water column before it reaches the sea. The Ave Estuary (Portugal) has been selected as a suitable experimental site for the BB implementation. This work aims to evaluate the ecological status of Ave Estuary, before and after the BB installation, as well as to assess the effectiveness of the system in improving the water quality. **Methods:** In spring, autumn, and winter 2023 (before BB) and spring 24 (after BB), the evaluation of the ecological status was performed considering hydromorphological elements (organic matter and granulometry of sediments), physical and chemical parameters (PC), and biologic elements (phytoplankton, and macroinvertebrates communities), following the guidelines established by the Water Framework Directive (Directive 2000/60/EC). In addition, sediment samples were collected to identify and measure microplastics (MP) present in the ecosystem. **Results:** Results before BB installation showed excellent condition of the ecosystem regarding the chlorophyll *a* concentration. Moreover, PC results classified this estuary as having a moderate ecological status, owing to the values of ammoniacal nitrogen and phosphate concentrations. The benthic macroinvertebrates showed a higher density in spring 2023, while the remaining sampling periods showed a higher diversity. However, the most prevalent species registered were opportunistic. For MP in the sediments, an average of 330 items/Kg was recorded. **Conclusions:** Ave Estuary has achieved a moderate ecological status, failing to comply with the WFD objective.

Keywords: Microplastics, Estuary, Ecologic status, Water Framework Directive.

21382 | Ecotoxicological effects of caffeine residues on *Daphnia magna*

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Background & Aim: Caffeine (CAF), widely consumed in beverages, food products, and pharmaceuticals, emerges as a notable contaminant due to its widespread occurrence in aquatic compartments with potential bioactivity towards non-target organisms. Literature reports that CAF can be detected in rivers and streams around the world at concentrations ranging from ng/L to µg/L, depending on location, population density, and proximity to sources of contamination. This study aimed to investigate whether caffeine induces significant ecotoxicological effects on *Daphnia magna*. **Methods:** Three bioassays were performed: 1) feeding assay (24 hours; 248.7 – 1000 mg of CAF/L); 2) subchronic assay (10 days; 3.75 – 60 mg of CAF/L); and 3) chronic assay (21 days; 4.61 – 35 mg of CAF/L). Feeding rate and life history parameters were evaluated, as well as biochemical biomarkers (antioxidant defense, lipid peroxidation, and neurotransmission) in the survival organisms. **Results:** An EC₅₀ of inhibition feeding rate was observed at 323 mg CAF/L, and biochemical responses showed that CAF induces oxidative stress (a significant decrease in catalase and glutathione S-transferases activities up to 498 mg/L) and neurotoxicity (a decrease in acetylcholinesterase activity in all concentrations tested). Organisms exposed to the subchronic assay showed a significant decrease in somatic growth rate and rate of population increase up to 60 mg CAF/L. Biochemical biomarkers showed that CAF induced oxidative stress, with an increase in catalase activity and a decrease in glutathione S-transferases activity (up to 7.5 mg/L), and neurotoxicity effects with an increase in acetylcholinesterase activity, only at 60 mg CAF/L. **Conclusions:** The here-presented results showed that CAF residues (up to 60 mg/L) induce negative impacts on *D. magna* performance. This study aims to alert the scientific community and society to the issue of environmental contamination and ecosystem safety in the face of CAF concentrations detected in surface waters.

Keywords: Aquatic Ecotoxicology, Risk assessment, Caffeine, *D. magna*.

21405 | Social Preference of Human-hand raised and Socialised Wild Boars

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Background & Aim: This study was the first carried out under social preference in socialised and human-hand raised wild boars. In literature, there are reports of wild social species, which if socialised positively and early with humans, can prefer and discriminate a familiar human over strangers. This leads to the speculation that domestication is just a social interspecies facilitator, being the positive and intense socialisation the most important factor in social preference. In this regard, our study aims to investigate the social preference between a familiar person (FP) and a stranger (S) or a familiar object (FO) in socialised and human-hand raised wild boars. **Methods:** Four wild boars were used in this study, which were divided in: Test 1-Strangers vs. Familiar Person (n=3), and Test 2-Familiar Object vs. Familiar Person (n=4). The test consisted of releasing one wild boar at a time at a starting point, which was equidistant from the two interveners, and recording their behaviour for three minutes. Through *Solomon coder*, the variables: *Near Near*, *Near*, *Contact*, *Zone*, *Away*, *First approach the 'targets'*, *Contact ratio* and *Preference index*, were analysed and quantified. **Results:** The data was analysed using the statistic program *R*. Our study revealed that, in both tests, wild boars' approach firstly and more frequently the familiar person and prefer to be next to the FP than FO or S. They show a preference of being in the *Social Area* rather than in the *No Social Area*. In addition, they spent more time around the familiar person in Test 2 than Test 1. **Conclusions:** Despite the small sample, our study suggests that socialised and human-hand raised wild boars prefer and discriminate the familiar person, highlighting the importance of intense and positive socialisation on social preference.

Keywords: 'Social Preference', 'Wild Boars', 'Hand Raised', 'Human Discrimination'.

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21421 | Application of the new criteria for Differentiated High Grade Thyroid Carcinoma to a series of recurrent thyroid cancer: a retrospective study of 138 cases

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Background & Aims: In the latest 5th WHO's Classification of Tumours of Endocrine Organs, a new term was created to identify those cases, at the time of pathological evaluation, which have a worse prognosis within differentiated follicular cell-derived thyroid carcinomas (DFCDTC): Differentiated High Grade Thyroid Carcinoma (DHGTC) [1]. In our work, we aimed to evaluate its frequency and clinicopathological features within a series of recurrent DFCDTC. **Methods:** We gathered several clinicopathological characteristics of a retrospective cohort of 138 patients with primarily resected thyroid cancer which recurred after total thyroidectomy and adjuvant radioiodine therapy. We also reclassified them as DHGTC according to 5th WHO's criteria; compared DHGTC to non-high grade differentiated follicular cell-derived thyroid carcinomas (non-HG-DTC) and described the clinical behaviour and pathological features of thyroid cancer with radioactive iodine refractoriness. **Results:** We found that DHGTC's prevalence is higher than what is described in studies without prior clinical selection. In comparison to non-HG-DTC, DHGTC cases were significantly associated to several adverse clinicopathological features: higher tumour size; tall-cell subtype of PTC; mitotic index ≥ 5 ; tumour necrosis; lymphovascular invasion; high AJCC 8th edition pT stage; distant metastasis; lung metastasis; synchronous metastasis and persistence of disease at the end of follow-up. Furthermore, the number of cases which developed RAIR (n=12 [8,7%]), despite low, is quite significant, as the estimated incidence of these forms of cancer is of 4-5 cases/year/million people, and we described their clinicopathological characteristics. **Conclusions:** Our results strengthen the clinical usefulness of DHGTC classification by indicating patients with worse prognosis features and at a higher risk for progression highlighting the need for tight surveillance in patients with these forms of cancer.

Keywords: Thyroid Cancer, Differentiated High Grade Thyroid Carcinoma, Radioactive Iodine Refractoriness, Prognosis.

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21428 | The power of machine learning to reveal hidden microbiome metabolites

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Background & Aim: The collection of microorganisms that colonize the human body, together with their genetic information and the niche conditions, is known as the microbiome. The microbiome has been implicated in the initiation and progression of several diseases, namely in cancer. Therefore, molecular characteristics of the microbiome can be considered as potential disease biomarkers. However, information on the metabolic capabilities of the microbiome is largely unknown. Furthermore, distinguishing between host-produced metabolites and those synthesized by the microbiome is challenging. Therefore, our primary goal is to develop a novel bioinformatics framework for identifying the taxonomic composition of the microbiome and its associated metabolites in human tissues. **Methods:** Using gastric cancer as a model, pairs of metabolomics and metatranscriptomics data from 12 Portuguese patients were used to train the machine learning (ML) algorithm. The metatranscriptomics data were processed using reference bioinformatics tools and several in-house Python and Bash scripts. The ML model was trained using Melonnpn, which fits an elastic net model. **Results:** The trained model successfully identified 72 microbiome metabolites in gastric cancer with positive correlation between predicted and observed values. Most of the metabolites could be classified into six chemical classes including carboxylic acids and derivatives, purine nucleosides, organooxygen compounds, imidazopyrimidines, diazines, and indoles and derivatives. **Conclusions:** The initially trained ML model shows good potential for broader application to larger datasets. Future re-training of the model with additional data will improve its robustness for predicting microbiome metabolites in tissues.

Keywords: Microbial Metabolites, Metatranscriptomics, Metabolomics, Gastric Microbiome, Gastric Cancer.

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21434 | Exploring the possible link between fluoride sensitivity and bacterial defluorination

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Background & Aim: Fluoroorganic compounds are ubiquitous environmental pollutants due to their widespread use and high environmental persistence, mostly attributed to the stability of their carbon-fluoride bonds. The biotransformation of these compounds has been observed in some microorganisms, but defluorination (cleavage of carbon-fluorine bonds) remains the limiting step. Intracellular accumulation of fluoride occurs during microbial defluorination, which can cause several toxic effects. This work hypothesizes that intracellular fluoride stress may potentially affect the defluorination process in bacteria, limiting this critical catabolic step for the eventual mineralization of fluoroorganic pollutants. **Methods:** Fluoride sensitivity was first ascertained in defluorinating bacteria *Labrys portucalensis* F11 and *Delftia acidovorans* MFA5 (known degraders of fluorobenzene¹ and fluoroacetate², respectively), with an *Escherichia coli* strain as the non-defluorinating control. Sensitivity was tested for increasing concentrations of fluoride (0-0.6 mM NaF) both in oligotrophic (minimal salts medium with acetate) and mesotrophic media (Nutrient Broth), based on bacterial growth inhibition for 48 hours at 28 °C. After ascertaining their sensitivity thresholds, these strains are now being tested for their defluorination ability, against their preferred fluorinated substrates, when exposed to the NaF concentration with the highest observed growth inhibition. **Results:** Results showed that fluoride stress was more severe in oligotrophic media, with 0.4 mM NaF presenting the highest growth inhibition among tested strains. Strain MFA5 was also shown to be the least sensitive to fluoride, while F11 was the most affected. **Conclusions:** Fluoride can exert cytostatic effects even in bacterial strains with proven ability to biodegrade fluorinated compounds. These results will allow to enlighten the ties between fluoride sensitivity and bacterial defluorination, thus broadening the knowledge on influencing factors of a critical catabolic reaction.

Keywords: Fluoride, Toxicity, Defluorination, Fluorobenzene, Fluoroacetate.

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21461 | Invisible dangers on our plates: a critical review of the widespread presence of microplastics and nanoplastics in food

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Background & Aim: Plastics have become ubiquitous, revolutionizing many aspects of daily life^{1,2}, but at a cost to the environment and human health. Their widespread use and inadequate disposal practices have filled our environment with tiny particles known as microplastics (MPs) and nanoplastics (NPs)^{3,4}. MPs/NPs endanger both animals and humans; not only by carrying adsorbed toxic chemicals, but their presence in the food chain also poses a direct threat to human health^{1-3,5}. This study aims to assess the extent of MPs/NPs contamination in our food and beverages, highlighting the urgent need to mitigate this invisible danger and explore future directions. **Methods:** An exhaustive literature review was conducted on PubMed, Scopus, and Web of Science up to August 15, 2023, identifying 4078 studies on MPs/NPs in the food chain. After removing duplicates and unrelated studies, 229 articles focusing on edible products/beverages were reviewed, yielding 1630 data points. Data on food type, detection methods, color, shape, chemical composition, and MPs/NPs count were systematically organized. **Results:** Our study revealed that over 95% of tested food items were contaminated. Detection methods predominantly used were FTIR spectroscopy and microscopy, revealing mainly blue, black, red, transparent, and white fragments and fibers. Polypropylene, polyethylene, and PET were the main polymers found in the diverse food groups. Fruits and vegetables emerged as the most contaminated group with an alarming rate of 126150 items/g, followed by sauces, beverages and dairy products with 45 to 8 items/L. Seafood, sweeteners, canned food, salts, and meat (0.7 up to 0.014 items/g) as well as rice (56 µg/g) and soy-based products (0 µg/g) showed the lower contamination levels. **Conclusions:** The research highlights significant knowledge gaps in understanding MPs/NPs occurrence in our diet and their health implications, emphasizing the need for broader studies and urging policy reforms to mitigate this environmental issue.

Keywords: Microplastics, Nanoplastics, Prevalence, Food Chain Contamination.

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21506 | Ecotoxicological evaluation of caffeine in standard aquatic species

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Background & Aim: Caffeine (CAF) is an emergent organic contaminant that is present in different sources (pharmaceuticals, food, drinks, cosmetics, and hygiene products) and has been detected in different environmental matrices, causing potentially undesirable effects in non-target organisms. This study aims to evaluate the effects of CAF in standard aquatic species belonging to different trophic levels of an aquatic ecosystem, namely in the: macroalgae *Raphidocelis subcapitata*, macrophyte *Lemna minor*, and insect larvae *Chironomus riparius*.

Methods: CAF exposures were conducted in different assays according to standard guidelines evaluating: 1) growth inhibition in *R. subcapitata* (3 d; 3.9-1000 mg/L) and 3) *L. minor* (7 d; 3.9-1000 mg/L); 4) *C. riparius* acute effects (2 d; 426.4-1500 mg/L) and 5) emergence (10 d; 18.2-700 mg/L). *L. minor* biochemical analyses [catalase (CAT) and glutathione S-transferases (GSTs) activities, proline (PRO) and malondialdehyde (MDA) contents] and quantification of pigments (chlorophyll and carotenoids) were evaluated. In *C. riparius*, CAT, GSTs, and acetylcholinesterase (AChE) activities and thiobarbituric acid reactive substances (TBARS) levels were also quantified.

Results: The first results showed: 1) $100 < EC_{50} < 1000$ mg/L for *R. subcapitata*; 3) $EC_{50} = 520.7$ (131.2-910.1) mg/L for *L. minor* and 4) $100 < LC_{50} < 1000$ mg/L for *C. riparius*. *L. minor* biochemical analyzes showed that CAF induces oxidative stress (decrease of CAT activity at all concentrations and in GSTs activity at 500 mg/L, and an increase at 31.25 and 1000 mg/L at GSTs). Moreover, a decrease in carotenoids and an increase in chlorophyll contents were observed. *C. riparius* emergence assay showed an increase in mortality, a decrease in growth, and biochemical disturbances with the increase in CAF concentrations. **Conclusions:** More studies are necessary to fully understand the ecotoxicological effects of CAF and develop strategies to mitigate its impact on biota of the aquatic ecosystems.

Keywords: Ecotoxicology, Risk Assessment, Caffeine, Standard Species.

21514 | New triazol-isatin derivatives for lymphoma treatment: cytotoxic effects and identification of molecular targets

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We are testing a series of new N-1,2,3-triazole-isatin hybrids that show promise as tumour antiproliferative agents. These hybrids appear to be cytotoxic specifically to colon, lung and breast cancer cells. The results obtained are particularly significant for breast cancer cells in which some of these compounds appear to alter the expression of genes encoding the epigenetic regulators p-300 (Histone Acetyltransferase P300) and APT-2 (Acyl-Protein Thioesterase 2). These results suggest an effect of these compounds on gene expression in particular oncological contexts. This work aims to test the effect of these new compounds on a particular type of lymphoma that lacks targeted therapies: diffuse large B-cell lymphoma (DLBCL). This lymphoma is an aggressive and fast-growing type of non-Hodgkin's lymphoma (NHL), which develops when the human body begins to produce abnormal B lymphocytes. Currently, the treatments available for this oncological disease are ineffective for a third of patients. We performed MTT assays using a representative cell line of this lymphoma subtype (SU-DHL-4) to measure cellular metabolic activity as an indicator of cell viability, proliferation, and cytotoxicity. This technique allowed calculating the IC50 value for each compound tested, measuring the potential efficacy as a therapeutic agent. After this, we conduct gene/protein expression analyses to identify potential molecular targets. Our data suggest that these compounds may represent promising new therapies for the treatment of DLBCL.

21534 | Multiresistant bacteria in the Douro River in the urban region of Porto

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Background & Aim: The presence of antibiotic-resistant bacteria in the environment is of great concern in terms of public health. The aquatic environment is a favorable environment for the spread of multi-resistant bacteria and antibiotic-resistance genes, creating a high risk for human and animal health. This study detected bacteria from the Enterobacteriaceae family producing ESBLs and carbapenemases in Douro River water, collected near Rua do Ouro - Cais do Rio Douro and Ribeira da Granja in the urban region Porto. **Methods:** Volumes of 0.1 mL to 200 mL were filtered, using 0.45 µm of diameter of pore cellulose acetate membranes, placed on MacConkey agar with cefotaxime and meropenem and MacConkey agar without antibiotics. Lactose fermenting strains were selected, and disk diffusion method was carried out considering EUCAST and CLSI parameters to evaluate antimicrobial susceptibility. Phenotypic evaluation of ESBL and carbapenemase producers and was carried out by CIM (carbapenem inactivating method). Molecular analysis of resistance genes was carried out by PCR. **Results:** Of the 9 isolates across the different collection area, 4 were selected on cefotaxime and 5 on meropenems. Regarding phenotypic tests, 6/9 were positive for ESBLs, 2 of them on meropenem and 8/9 were confirmed through CIM. Regarding resistance to β-lactams, 3/9 were resistant to all classes, while 5/9 were susceptible to FOX (2/5), FEP (2/5), and MRP (3/5). Resistance to non-β-lactams was as follows: C (1/9), CIP (6/9), F (4/9), FOS (2/9), TE (4/9). The isolates were subjected to presumptive identification, with 7/9 belonging to the KESC group, 1/9 *Pseudomonas* and 1/9 *Escherichia coli*. The predominant resistance genes in these samples were bla_{KPC}, bla_{VIM}, bla_{OXA-48}, bla_{SHV}, bla_{TEM}, bla_{OXA_v}, and bla_{CTX-M} group 1. **Conclusions:** Antimicrobial resistant threats in aquatic environment creates a link to spread relevant from the “One Health” point view promoting resistance spread.

Keywords: Antimicrobial Resistant Bacteria, Carbapenem Resistant, Extended-Spectrum Beta-Lactamases.

21568 | Coastal Hide-and-Seek: a taxonomic study of fauna associated with northwest Iberian calcareous habitats

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Rhodoliths are aggregations of red coralline algae that create a complex structure that sustains benthic communities commonly observed globally in coastal marine environments (Foster, 2001; Costa, D. A. *et al.*, 2023). Rhodoliths are complex dynamic ecosystems that harbour several other species, in cases even providing more diversity than the surrounding seagrasses, kelp forests or muddy banks habitats (Hernandez-Kantun *et al.*, 2016). Nevertheless, research on rhodolith-associated diversity (such as in-depth taxonomic and ecological surveys) has been limited when compared to other biogenic habitats (remarkably in the European Atlantic). This study aims to describe the rhodolith-associated polychaeta and pycnogonid species present on the intertidal pools of the northwest Iberian Peninsula. A series of intertidal pools from two beaches were chosen, and three rhodoliths were seasonally collected for posterior triage of their associated macrofauna. Specimens were identified to the species level, whenever possible, based on morphological taxonomic guides and vouchers prepared. In addition, we searched for the taxonomic coverage of the species in barcoding libraries (Ratnasingham, S. *et al.*, 2007). From a total of 897 sorted specimens, 810 polychaetes and five pycnogonids were initially identified at the specific level (likely morphotypes), in 48 species belonging to 17 families, including some new records for Portugal. It was detected that almost one-third of the species lacked molecular identification and three-quarters were poorly represented. Our results highlight a knowledge gap in the biodiversity of fauna associated with rhodoliths and reveal them as phylogenetic and ecological refugia for intertidal benthic communities.

Keywords: Intertidal Fauna, Polychaeta, Pycnogonida, Rhodolith-Associated Fauna, Scientific Collections.

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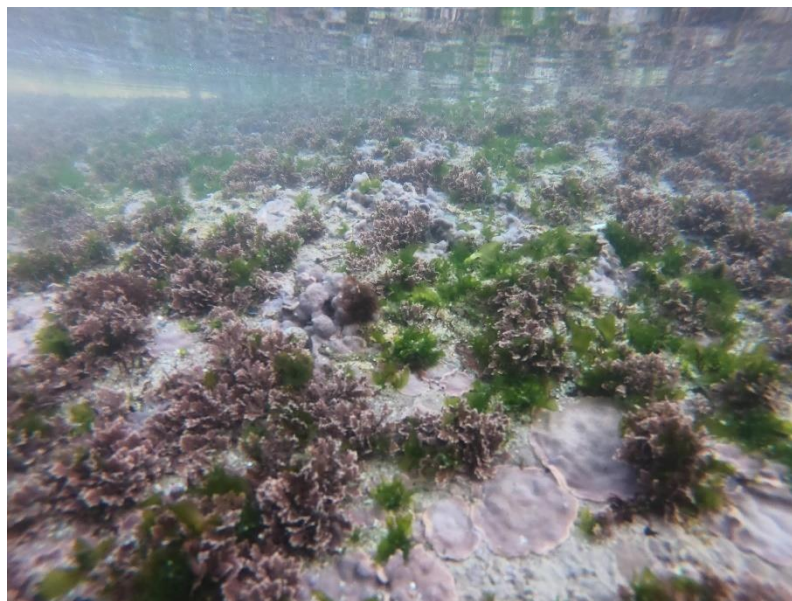


Figure 1. A colony of encrusting-rhodoliths (with epibiont algae *Corallina* sp. and *Ulva* sp.) in the intertidal zone of the Forte do Cão Beach, Vila Praia de Âncora, Portugal. Photo: D. M.

21572 | Assessment of Antioxidant Capacity in Macroalgae: Comparative Analysis of Species, Treatment and Extraction Methods

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Background & Aim: Macroalgae offer a novel and added-value dietary ingredient in formulated diets for fish. Aside from their basic nutritional value, macroalgae possess notable antioxidant capacity due to their rich composition of bioactive compounds and have gained attention due to their potential benefits in the improvement of fish health while being sustainable at social, economic, and environmental levels. However, the antioxidant capacity of macroalgae depends on macroalgae species, due to their distinct compositions of bioactive compounds. Moreover, the extraction method can also affect the yield and activity of antioxidants obtained from macroalgae. Thus, *Ulva rigida*, *Codium tomentosum*, *Gracilaria gracilis*, *Palmaria palmata*, and *Fucus vesiculosus* produced under commercial conditions were selected to unravel their antioxidant capacity. **Methods:** For that purpose, all macroalgae samples were submitted to a solid alkaline hydrolysis under the following conditions: 1N NaOH (solid: liquid 4:3) autoclaved for 30 min at 121°C. The untreated sample of each macroalgae species was used as a control. To evaluate the best extraction method to obtain the maximum antioxidant capacity, 3 different extraction methods (Aqueous, Methanol/Acetone; and a Natural Deep Eutectic Solvent (NADES) Extraction with a Choline Chloride and Malic Acid 1:2 molar ratio solution) were applied to untreated and treated macroalgae. Total Phenolic Compound Content and Scavenging Activity were assessed using Folin-Ciocalteu's reagent and a DPPH assay respectively. **Results:** The algae that showed the highest antioxidant activity was the untreated *Fucus vesiculosus* extracted with Methanol/Acetone, presenting an average of 20.16 µmol trolox equivalent/ml, followed by untreated *Fucus vesiculosus* extracted with NADES (12.42 µmol trolox equivalent/ml) and treated *Gracilaria gracilis* extracted with NADES (6.15 µmol trolox equivalent/ml). Regarding the phenolic compound content, treated and untreated *Gracilaria gracilis* extracted with NADES presented the highest amounts, with an average of 18,45 mg/g and 18,09 mg/g, followed by treated *Palmaria palmata* extracted with NADES (14,03 mg/g). **Conclusions:** The obtained results showed that the solid alkaline hydrolysis treatment is beneficial, as overall, treated algae

presented higher scavenging activity. Moreover, the NADES extraction method was the most promising, being only surpassed by Methanol/Acetone in the case of untreated *Fucus* and *Gracilaria*.

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21585 | Characterizing the amphibian diversity of Makay (Southwestern Madagascar)

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Background & Aim: Madagascar has a large account of amphibian endemic species and Makay, a region of Southwestern Madagascar island, is an almost unexplored location, due to the difficulty of accessing the place. So, this work aimed to characterize the amphibian fauna of the region, contributing to its preservation and conservation. **Methods:** Samples collected *in situ* by Angelica Crottini expedition, or other researcher's expeditions, were used to identify the species via molecular methods, using the DNA of these organisms to match already existing sequences from data banks and confirm the sample's identity. **Results:** 11 species were identified as Least Concern (IUCN classification), one species was identified as Endangered, three were identified as non-assessed species, one was identified as data deficient, and four were identified as candidate species. **Conclusions:** More expeditions and research must be done in Makay to study and identify the amphibian fauna of the region, only in this way the conservation and preservation of these organisms can be assured.

Keywords: Makay, Amphibians, Conservation, Characterization, Identification.

21600 | *PNPLA1*: A story of gene loss in specific Cetacea lineages

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Background & Aim: Cetacea land-to-water transition was marked by extreme changes, shaped by processes such as gene loss [1], allowing them to live and prosper in aquatic environments. Adaptation to such environments included changes in cetaceans' skin, resulting in phenotypic features that are distinctive of this group [2]. This organ is an important barrier in all mammals, playing a crucial role in protecting against external agents [3]. Here, we investigate the molecular evolution of the Patatin Like Phospholipase Domain Containing 1 (*PNPLA1*) gene in cetaceans. Involved in synthesizing omega-O-acylceramides, *PNPLA1* plays an essential role in the formation of the skin barrier and in the regulation of lipidic composition of the phospholipidic membrane [4]. Mutations in *PNPLA1* can lead to changes in the intracellular lipid composition, affecting membrane composition, trafficking, and endocytic pathways [5]. **Methods:** We used a consolidated pipeline [6], to analyze the coding status of *PNPLA1* across 47 Cetacea genomes, complemented with transcriptomic data, and immunohistochemistry assays. **Results:** Our results revealed that the loss of this gene is unique in sperm whales (superfamily Phyteteroidea). Additionally, transcriptomic data further supported a scenario of gene erosion. Further analysis with light microscopy immunohistochemistry on the sperm whale (*Physeter macrocephalus*) skin aimed to confirm the loss of the *PNPLA1* protein in this specific group. Phenotypically, knockout mice models for *PNPLA1* exhibit overaccumulation of lipidic droplets [5], which are a source of compounds with non-shivering thermogenesis and anti-freeze properties [7]. Consequently, the dismantling of *PNPLA1* in sperm whales might be adaptive, as it could improve thermal insulation during long deep dives. **Conclusions:** In conclusion, the present results constitute a strong approach to unravel gene loss events in specific lineages and advancing our understanding of the molecular foundations of phenotypic variation.

Keywords: Cetacea, Sperm whales, Gene loss, *PNPLA1*.

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21622 | Functional Glycomics and Glycoproteomics Characterisation in Gastric Cancer

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Background & Aim: Gastric cancer represents a major health burden due to the lack of specific symptoms in early stages and the scarcity of effective treatment for the management of advanced disease, contributing to an unfavourable prognosis. Consequently, it is imperative to discover new therapeutic options [1]. Gastric cancer is associated with a profound remodelling of the cellular glycome, namely an aberrant expression of truncated *O*-glycans and branched *N*-glycans, as well as an increase in sialylation and fucosylation [2]. Characterising these changes may pave the way for a better understanding of the molecular mechanisms behind tumour progression, potentially leading to the discovery of novel cancer-specific therapeutical targets.

Methods: This study starts with the portrayal of the glycome of formalin-fixed paraffin-embedded gastric tumour tissues to evaluate the changes in glycan content occurring during cancer progression. An *O*-glycoproteomics analysis was performed next using an in-house developed protocol focused on carriers of STn and SLe^A through a lectin-based enrichment.

Results: We observed that advanced stage tumours exhibit lower levels of core 4 and hybrid *N*-glycans and higher levels of paucimannoses than earlier stages. Regarding the *O*-glycoproteomics analysis, we identified a total of 1814 proteins. After an extensive bioinformatics analysis CEACAM5 emerged as a potential target. Due to its presence in certain healthy tissues, we explored specific glycoforms, namely CEACAM5-STn and CEACAM5-SLe^A. Our findings have shown a significantly increased expression of these glycoforms in gastric cancer, not being reflected in relevant healthy tissues, highlighting their potential for therapeutic application. **Conclusions:** We have only uncovered significant disparities in the *N*-glycosylation

pattern between early and advanced stage gastric cancer. Moreover, the specificity of CEACAM5 glycoforms in gastric cancer sets the foundations for the development of novel therapeutic approaches.

Keywords: Gastric cancer, *O*-glycomics, *N*-glycomics, *O*-glycoproteomics, CEACAM5.

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21623 | Functional Glycoproteomics Characterization of Gastric Cancer Cells

Expressing Immature O-glycans

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Background & Aim: Gastric cancer (GC) still presents high mortality rates¹, urging the need for novel therapeutics. Aberrant protein glycosylation is correlated with GC aggressiveness and poor prognosis, especially when tumours express short-chain O-glycans such Tn and Sialyl-Tn (STn) antigens^{2,3}. Thus, the presence of these truncated glycans on the cell surface offers an opportunity to explore new theragnostic approaches. This work aimed to develop and characterize a GC cell line overexpressing Tn and STn, and determine their functional implications on cell aggressiveness. Moreover, it aimed to establish a reliable protocol to study the glycoproteome of cell surface proteins. **Methods:** The GC AGS cell line was glycoengineered to knock-out the *C1GALT1* gene and overexpress Tn and STn antigens. The genotypic characterization of the model was performed by Indel Detection by Amplicon Analysis and Sanger Sequencing, while the phenotypic validation was achieved by immunofluorescence and flow cytometric analysis. Functional characterization was assessed through *in vitro* proliferation, migration, invasion, and colony formation assays. Subsequently, a robust method involving biotin-neutravidin coupling was developed to explore the glycoproteomic profile of the glycoengineered cells. **Results:** The Tn and STn overexpressing cells exhibited reduced migratory ability while displaying increased invasive potential and resistance to anoikis. Additionally, a protocol based on biotin labelling followed by cell scraping and neutravidin enrichment was established. **Conclusions:** This work demonstrates that the overexpression of Tn and STn antigens leads to enhanced invasive and colony formation capabilities, both associated with

cancer aggressiveness. The established enrichment protocol targeting membrane proteins will be used to characterize the glycoproteomic profile of the engineered cells, offering a promising future to develop targeted interventions, and revolutionizing the clinical management of GC.

Keywords: Gastric cancer, Glycosylation, Tn, STn, Glycoproteomics.

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21624 | GlycoMAPP - Exploring the Impact of Glycosylation on Macrophage

Polarization in the Context of Tumour Progression

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Background & Aim: Cancer is recognized as a complex disease intrinsically linked to numerous cellular changes, including glycosylation alterations, that occur early in carcinogenesis¹⁻³. The most common alterations in the glycosylation pattern of proteins in cancer are the formation of truncated *O*-glycans, such as Tn and Sialyl-Tn (STn), which have been shown to have a significant impact on the suppression of the immune response due to their ability to modulate the presentation of antigens, compromising certain immune cells present in the tumour microenvironment⁴⁻⁶. Therefore, this work aims to understand the effect of cancer-associated short-chain *O*-glycans on macrophage immune signature, including the identification of mediators involved in immune evasion. **Methods:** Therefore, it will be necessary to perform *in vitro* co-cultures between the glycoengineered cancer cell lines and macrophages, followed by flow cytometry analysis. In addition, the cytokine/chemokine signature resulting from this interaction will be determined by multiplex analysis using the conditioned media of the co-cultures. These data will be validated by immunofluorescence on Tn⁺/STn⁺ and Tn⁻/STn⁻ tumour tissues. Further, a proteomic analysis will be performed to identify the receptors involved in the interaction between macrophages and edited cell lines by using crosslinking assay followed by mass spectrometry. **Results:** Immature macrophages co-cultured with T24 Tn⁺ bladder cancer cells exhibited downregulation of CD86 and HLA-DR (both highly expressed in pro-inflammatory macrophages), while upregulation of CD206 (associated with anti-inflammatory macrophages M2a). These findings suggest a potential role of Tn antigen in modulating macrophage polarization within the tumour microenvironment. **Conclusions:** In this work, we propose to

understand the immunomodulatory effect of short-chain *O*-glycans on macrophages and discover potential therapeutic targets for immunotherapy that can restore immune surveillance against cancer.

Keywords: Macrophages, Cancer Immunotherapy, Glycosylation, Glycan-Binding Receptors.

Acknowledgments

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21646 | Nanoencapsulation of Vitamin K3 for pet food fortification

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Background & Aim: Vitamin K3 is fundamental to pet diets. As a matter of fact, it is necessary to incorporate this essential micronutrient in food with the objective of improving dogs' health and life by providing sufficient intake to prevent diseases. To ensure suitable, safe, and adequate nutrition value, nanoencapsulation emerges as a potential delivery system. This work aimed to develop and characterize lipid nanoparticles (solid lipid nanoparticles, SLNs, and nanostructured lipid carriers, NLCs), containing vitamin K3 to assure its protection during the production and storage stability of animal feed.[1] **Methods:** Formulations of SLNs and NLCs were produced using the hot homogenization method. The effect of solid lipids (precirol, Pre, and gelucire, GEL) and surfactants (tween 80 and pluronic F68) were evaluated to reach the optimal nanoparticles (NPs) regarding their: physical characteristics, ability to encapsulate the vitamin K3, stability, and resistance to the stomach and intestine. **Results:** The particle size, polydispersity index, zeta potential, and vitamin content in most of the nanoparticles (NLCs of Pre, SLNs of GEL, and NLCs of GEL) were stable when stored at room temperature for a month. The encapsulation efficiency of the stable formulations was above 98 %. Cell viability tests demonstrated that fibroblasts (L929) are viable in contact with 7 µg/ml in vitamin K3. The nanoparticles obtained containing or not vitamin K3 were subjected to in vitro assays simulating gastrointestinal digestion and only NLCs of Pre were destroyed in the stomach. **Conclusions:** The determined characteristics indicate that SLNs and NLCs of GEL demonstrated promising potential for further investigation and probably to be integrated as nanocarriers in animal feed fortification.

Keywords: Bioaccessibility, Nanoencapsulation, Nanostructured Lipid Carriers, Solid Lipid Nanoparticles, Functional Food.

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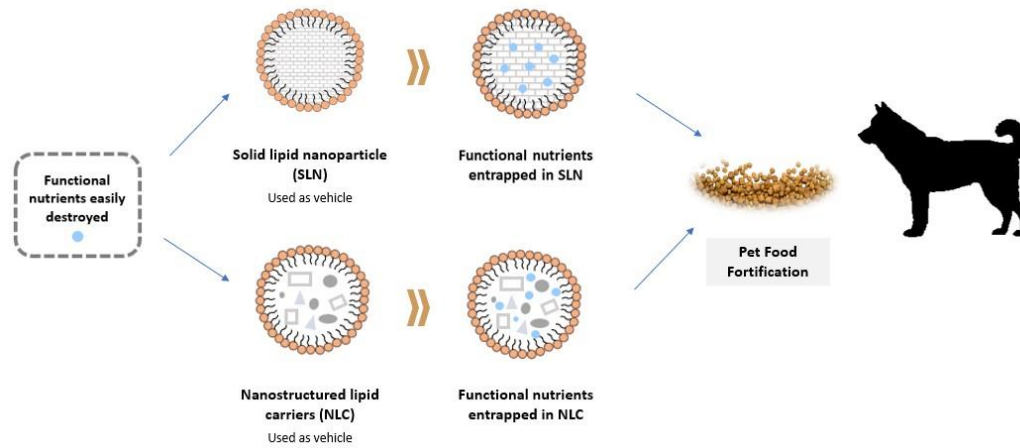


Figure 1: Nanoparticles with Vitamin K3 for pet food fortification.

21662 | T(AHR)getting the AHR: Navigating the path of a xenobiotic sensor, from disease to a therapeutic target

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Background & Aim: Treatment and disease are complex scenarios involving many players, including the Aryl Hydrocarbon Receptor (AHR). The AHR is a highly conserved ligand-dependent transcription factor, which recently gained recognition as a major player in different biological contexts, including disease¹. Our group and others have shown that AHR modulation, including by therapeutic drugs, impacts disease outcomes and treatment efficacy in diseases such as cancer and bacterial infections¹⁻³. Albeit, the extent of clinically approved drugs with AHR modulatory properties and their elicited functions is largely unknown. Herein, we aim to identify novel drugs with AHR modulatory properties. **Methods:** 3178 drugs were examined using an AHR cell reporter assay, followed by *in silico* modeling and ligand binding approaches. The hits identified were classified according to their known targets, pathways, and diseases, via pathway analysis (e.g., Ingenuity Pathway Analysis) and data mining approaches^{2,4,5}. For selected hits/drugs, we assessed AHR modulation *in vitro* (e.g., gene expression, enzymatic activity) and its elicited responses^{2,4-7}. **Results:** We identified 228 hits as potential AHR agonists or antagonists and calculated the respective EC_{50s} or IC_{50s}. Next, AHR modeling studies predicted 84 agonists or antagonists to bind to this receptor. According to their roles in different pathological and treatment conditions, such as infection, we are currently assessing two drugs for AHR modulation. In addition, we are evaluating how these drugs impact the crosstalk between AHR and Hypoxia Inducible Factor 1 α , a transcription factor known to be modulated by these drugs. **Conclusions:** In all, we have identified different therapeutic drugs with AHR modulatory properties, enabling us to gain a deeper understanding of the biology of AHR in disease, of its

role in drug resistance mechanisms, and the identification of potential repurposing drugs targeting this receptor, paving the ground for future therapeutic approaches.

Keywords: Aryl Hydrocarbon Receptor, Disease, Drug Resistance, Drug Therapy.

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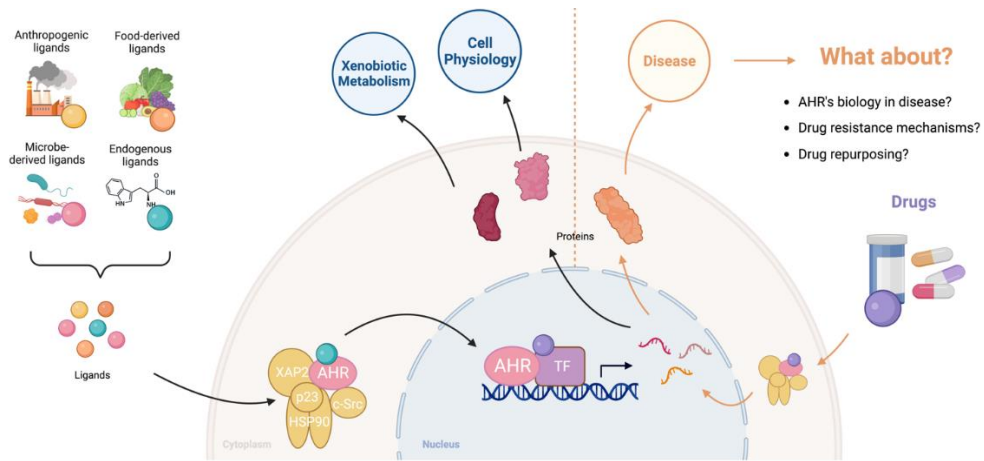


Figure 1: Project's "T(AHR)getting the AHR" aims.

21671 | Lipid Irony: Disruption of Iron and Inositol Metabolism in the Yeast Model of N88S Human Seipinopathy

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Background & Aim: Lipid droplets (LDs) are cellular structures dedicated to lipid storage, with a central core containing triacylglycerols (TAG) and sterol esters [1, 2]. Seipin, encoded by human *BSCL2* and yeast *SEI1*, is a membrane protein in the endoplasmic reticulum (ER) that forms homo-oligomers at ER-LD contact sites for TAG delivery to nascent LDs [3-5]. Gain-of-function mutations in *BSCL2* (N88S/S90L) lead to motor neuron diseases named seipinopathies [6-9]. Our yeast model of N88S seipinopathy [10] exhibits inclusion bodies (IBs) composed of WT-N88S and N88S-N88S oligomers, and reduced viability due to increased oxidative damage, lipid peroxidation and diminished antioxidant activity [10]. In this project, we performed a proteomic and lipidomic profiling of this model, aiming at defining changes in lipid and protein composition. **Methods:** Comparative quantitative untargeted mass spectrometric proteomic and lipidomic analyses were conducted to examine changes in protein and lipid abundance in WT and N88S mutant cells. Changes in lipid levels were quantified, and differentially expressed proteins were categorized into functional networks to highlight perturbed protein functions and signaling pathways. **Results:** We observed alterations in phosphatidic acid (PA) levels, associated with disrupted TAG and inositol metabolism and decreased flux towards phospholipid biosynthesis. These changes contribute to ER stress beyond IB formation. Additionally, iron homeostasis was disrupted, with N88S seipin-expressing cells displaying impaired ability to cope with iron deficiency. This was linked to changes in the expression of Aft1-controlled iron regulon genes, including the mRNA-binding protein *CTH2* and the high-affinity iron transport system member *FET3*, in a p38/Hog1- and Msn2-dependent manner. **Conclusions:** This model highlights iron dyshomeostasis and disruption of lipid metabolism as potential hallmarks of seipinopathy. The ultimate goal is to uncover new diagnostic markers and therapeutic targets through translational studies.

Keywords: Lipid Droplet, Neurodegeneration, Seipin, Seipinopathy, Omics.

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21708 | Using CRISPR-Mediated Approaches to Investigate the Function of Non-Coding DNA Variants in Type 2 Diabetes

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Background & Aim: Type 2 Diabetes (T2D) is a prevalent global concern associated with numerous health complications. Single nucleotide polymorphisms (SNPs) in non-coding DNA have been linked to T2D. How these SNPs contribute to the regulation of gene expression is not fully known. This study aims to understand how different nucleotide sequences influence the activity of cis-regulatory elements, particularly transcriptional enhancers, by investigating the impact of non-coding mutations on enhancer activity and transcription factor binding. **Methods:** In this project we used lentiviral enhancer reporter libraries to generate enhancer reporter mammalian cell lines, which we sequenced with Next Generation Sequencing (NGS). We used CRISPR tools to mutate the enhancers in these clones and then used cytometry to evaluate the impact of those mutations in reporter's expression. **Results:** We selected putative human enhancers and created lentiviral enhancer reporter libraries that we used to infect mammalian β -cells. We generated cell clones according to the cells' level of the reporter gene, GFP. We were able to sequence and genotype hundreds of stable enhancer reporter lines. Of this, 71 lines have one enhancer. In parallel, we validated 21 enhancers through sequence knockout, with CRE recombinase. Then, we designed and generated lentiviral libraries of sgRNAs and used various CRISPR tools to induce random mutations, in validated enhancers, in mouse MIN6 cells. **Conclusions:** We have validated several human enhancers. We are developing a methodology to evaluate and predict the impact of random mutations in the activity of enhancers. We were able to generate a set of enhancer reporter clones, validate them, optimize CRISPR tools for mutagenesis and mutate the enhancers in MIN6 cells. In the future, we will confirm the role of some enhancers' sequence in human pancreatic cells. Our approach will allow us to create predictions of mutations and transcription factor binding that impact the activity of enhancers.

Keywords: Type 2 Diabetes, Non-coding DNA, CRISPR.

21763 | Deletion of *VPS27* produces severe respiratory deficiencies in yeast cells lacking the Sit4 protein phosphatase

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Background & Aim: *Saccharomyces cerevisiae* Sit4 is a PP2A-like Ser/Thr protein phosphatase implicated in a wide landscape of cellular processes, namely regulation of cell cycle and budding, carbohydrate and lipid metabolism, and organelle function. Previous work demonstrated extended chronological lifespan in yeast cells lacking Sit4, accompanied by alterations in vacuolar morphology and function. The crucial contribution of vacuoles to longevity prompted a phosphoproteomic analysis on vacuolar membranes of Sit4-deficient cells that showed an increase in the levels of Vps27, which is critical for the *sit4Δ* lifespan. *sit4Δvps27Δ* cells display a dramatic decrease in cellular viability. This work aims to decipher the impact of Vps27 on vacuolar and mitochondrial functions and its implications in *sit4Δ* longevity. **Methods:** Vacuolar trafficking pathways and mitochondrial proteins were analyzed by Western blotting. Mitochondrial fitness was assessed by analyzing cell growth in fermentative (glucose) vs. respiratory (glycerol) media and oxygen consumption rate using a Clark's electrode. mtDNA was quantified by qPCR. All experiments were conducted in triplicates. Statistical analyses were performed using One-Way ANOVA. **Results:** The MVB pathway, microautophagy and macroautophagy were found to be impaired in both *sit4Δ* and *sit4Δvps27Δ* mutants. Defects on the CPY pathway were also observed in *sit4Δvps27Δ* cells. Deletion of *VPS27* in *sit4Δ* cells resulted in severe respiratory impairment, reflected in incapacity of growing in respiratory substrates and extremely low oxygen consumption. Also, we observed loss of Cox2, a protein encoded by mitochondrial DNA (mtDNA) in *sit4Δvps27Δ* cells, but the levels of mtDNA remained unchanged. **Conclusions:** Vps27-dependent longevity in Sit4-deficient yeast cells was found to be unrelated to alterations in some of the major vacuolar trafficking pathways. Our work unveiled a negative genetic interaction between *SIT4* and *VPS27* associated with mitochondrial dysfunction.

Keywords: Sit4, Vps27, Chronological lifespan, Vacuoles, Mitochondria

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21777 | Goji berries (*Lycium barbarum*) extract as new potential cosmetic ingredient

– A first screening

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Background & Aim: Currently there is greater concern about appearance and skin care products (1). Although cosmetic products are not associated with serious health problems, there are concerns related to undesirable effects due to the presence of potentially carcinogenic and allergenic ingredients (1,2). Thus, consumers have been increasingly looking for products of natural and plant-based origin. The use of these products is expected to increase exponentially, and studies are urgently needed to introduce new products into the market (1,3). Goji berry is a fruit with increasing popularity due to its richness in phenolic compounds, carotenoids, organic acids, carbohydrates, and vitamins (4). Its antioxidant, antimicrobial and anticancer activities make this product promising for cosmetic applications (4). The aim of this study was to study an ecological extract obtained from goji berries through ultrasound-assisted extraction as a new ingredient incorporated into a cosmetic formulation. **Methods:** Goji berry extract was obtained by ultrasound-assisted extraction, according to Silva *et al.* (5). To assess safety, *in vitro* assays were carried out on skin cell lines. Subsequently, several cosmetic formulations incorporating the extract were developed and characterized. **Results:** The results demonstrated that goji berries have no toxicity on skin cell lines. Cosmetic formulations containing the goji berries extract demonstrated to be suitable for application to the skin and maintained their characteristics during the storage period. **Conclusions:** Goji berries extract is safe and stable in cosmetic formulations, proving to be suitable for consumer needs.

Keywords: Goji Berries, Cosmetics, Herbal Products, Cosmetic Formulations.

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21778 | Exploring Plastic-Degrading Enzymes Towards Optimized Bioremediation

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Background & Aim: Plastic biodegradation by bacteria and their enzymes is an ecological solution for the emerging challenge of plastic waste accumulation, which risks ecosystems, wildlife, and human health. Scaling up this process, wherein enzymes break down polymers into smaller molecules that can be repurposed in the industry, could pave the way for a circular economy. These enzymes, belonging to the hydrolase family, present critical characteristics closely related to their function, like the presence of a catalytic triad and oxyanion hole residues. This project focuses on optimizing the plastic-degrading activity of these enzymes and identifying new candidates, contributing to the field of plastic bioremediation. **Methods:** This study involved the integration of two plastic-degrading enzyme databases, PlasticDB[1] and PMBD[2]. Furthermore, some missing data, mainly some PDB IDs, was fixed by using information from other databases. The PDB IDs are required to obtain other possible missing information, like sequences and UniProt IDs, and are necessary for the following project tasks, including 3D modeling techniques. Multiple Sequence Alignments (MSA) were performed for investigating differences and similarities among the sequences of known plastic-degrading enzymes, paving the way for future structural studies. **Results:** A final unified database that stores enzyme information regarding PDB IDs, GenBank, and UniProt accession numbers, and the enzyme sequence was obtained. The MSA revealed the existence of conserved and highly variable regions across the sequences. **Conclusions:** Through this study, the sparse data on plastic-degrading enzymes was integrated in one comprehensive database. The phylogenetic findings will be employed in protein structure prediction to evaluate the impact of genomic variants, particularly in critical functional regions, in protein folding and activity. Together, these insights will guide the optimization and design of improved plastic-degrading enzymes.

Keywords: Enzymatic Biodegradation, Bioremediation, Degrading Enzymes, Plastic Polymers, Databases.

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21808 | Modulating stress-metabolic interactions in gilthead seabream (*Sparus aurata*) with innovative hydrolysates, under a global changes scenario

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Background & Aim: Gilthead seabream (GSB; *Sparus aurata*) is a staple in aquaculture due to its economic potential, particularly in the Mediterranean region. One major challenge for this species is its susceptibility to low temperatures, facing a pathological condition called “winter disease” that can result in massive production losses. A possible solution is the use of functional feeds to modulate the GSB’s stress response. This project aims to investigate how to mitigate GSB’s thermal stress using hydrolysates as potential functional ingredients in aquafeeds.

Methods: Four diets were formulated: a practical diet as the control and 3 other diets including 3% of different protein hydrolysates (FISH, INSECT, SWINE) at the expense of CPSP90. Triplicate groups of juvenile GSB were fed the experimental diets, for 12 weeks before being subjected to a thermal stress challenge. The stress challenge involved lowering the water temperature from 20 to 15°C and maintaining it at 15°C for 5 days. Fish were individually weighed at the end of the feeding trial and plasma and liver samples were collected before and after the stress for biochemical profiling and oxidative status analyses.

Results: After the feeding trial, while feed utilization remained high for all experimental groups, fish final body weight was significantly increased in fish fed INSECT and SWINE diets compared to those on the CTRL and FISH diets. Regarding the plasma analyses, results showed an impact of stress decreasing cholesterol and lactate and increasing NEFA levels. Triglycerides levels were significantly increased in the INSECT group, regardless of the Stress condition. An interaction between Stress and Diet was observed for Lactate, wherein its levels decreased significantly under stress in all experimental groups except for SWINE. Oxidative stress results will be further discussed.

Conclusions: Overall, SWINE and INSECT diets promoted fish growth while modulating the GSB’s biochemical plasma profile and stress response.

Keywords: Aquaculture, Functional Feeds, Stress Resilience.

Acknowledgments

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21811 | Creating a Comprehensive Database of Plastic Degrading Enzymes for Machine Learning-Enhanced Optimization

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Background and Aim: The accumulation of plastics in the biosphere is one of the most significant concerns among scientists worldwide. These synthetic long-chain polymers are highly durable and resistant, given that traditional recycling processes have many disadvantages for the environment and public health. Biodegradation has become a more sustainable solution since it occurs naturally through specific enzymes with a bioremediation potential against plastic particles. These microorganism-produced enzymes participate in the cleavage of plastic polymers, enabling them to use the degradation products as a carbon or energy source. Although much data on these enzymes is available, it is widely dispersed across different articles and databases, making it one of our goals to unify it into a single database. **Methods:** In this work, enzyme-specific information was automatically retrieved from PAZy [1], exclusively listing biochemically characterized plastic-active enzymes, and from LED[2], listing lipases and related proteins sharing the same a/b hydrolase fold and containing structures present in various plastic-degrading enzymes described. **Results:** The main result obtained from this data was a database with information regarding PDB IDs, UniProt and Genbank accession numbers, and protein sequences. Furthermore, missing information regarding PDB entries from PAZy was minimized by crossing our data with other plastic-degrading enzyme databases and more general enzyme databases. In addition, some sequence-based biochemical descriptors have been calculated for the proteins from PAZy using the PyBioMed python package. These descriptors include CTD, autocorrelation, and pseudo amino acid count. **Conclusions:** Once the unified database is accomplished, structure-based biochemical descriptors will be calculated for all retrieved proteins, and a phylogenetic analysis to find variations in the critical conserved regions identified will be carried out. These results will be incorporated as input features in the training of ML models to predict the enzyme variants' potential efficiency.

Keywords: Plastic-Degrading Enzymes, Online Databases, Phylogenetic Analysis, Biochemical Descriptors, And Machine Learning (ML) Models.

Acknowledgements

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D.P. is funded by national funds through FCT under the Institutional Call to Scientific Employment Stimulus (reference CEECINST/00026/2018).

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21814 | Discovering the beta-oxidation pathway in cyanobacteria

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Background & Aim: Cyanobacteria are a very diverse phylum of photosynthetic prokaryotes. As the first known organisms to produce oxygen on Earth, these microorganisms were crucial to the development of biosphere and early Earth life forms. Cyanobacteria still presents several undefined genomic and metabolic pathways, despite its relevance, namely as a promising biological alternative to overcome the increasing demand for sustainable fuels and plastics. One of the still unclear pathways in cyanobacteria is beta-oxidation, the catabolic process of fatty acid (FA) degradation [2]. This mechanism had been thought to be universal for all organisms, however, some studies have suggested that beta-oxidation might be lacking in cyanobacteria [1][3][4], despite the scattered evidence to support this hypothesis. We have revealed unique results that may help finally understand this fundamental metabolic pathway in cyanobacteria. The experimental design of this work is very broad and started by a critical experimentation and bioinformatic analysis to clarify whether all cyanobacteria indeed lack the beta-oxidation pathway. Surprisingly, we discovered some cyanobacteria strains that encode putative fatty acid degradation (fad) machinery. By the genomic context analysis of these strains, we identified a new gene that completes the full set of fad genes necessary for beta-oxidation cycles, and we will further perform enzymatic assays of selectivity to understand its function by *in vitro* supplementation. Transcriptome evidence and different *in vivo* FA supplementation assays support these findings, showing for the first-time cyanobacteria strains that can degrade FA. These results allow to address several fundamental questions related to cyanobacteria evolution and FA metabolism. Furthermore, this study brings knowledge that would, ultimately, lead to more efficient metabolism engineering applied to biotechnological purposes.

Keywords: Fatty-Acid, Catabolism, Bioinformatics, Supplementation.

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21824 | Unraveling *NR5A2* Transcriptional Regulation in Pancreatic Cancer

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Background & Aim: Pancreatic cancer (PC) is described by high mortality rates representing a challenge in oncology. Several genome-wide association studies (GWAS) have identified PC linked alleles in non-coding regions. The growth and function of the pancreas depend heavily on non-coding cis-regulatory elements (CREs), such as enhancers, which regulate gene transcription by interacting with promoters. *NR5A2* is one of the genes with the highest number of non-coding alleles linked to PC in its landscape. In pancreas, *NR5A2* is important to maintain acinar identity. According to recent findings, heterozygous mutations in *Nr5a2* cause pancreatic inflammation, which may act as a trigger for PC development. Based on these data, we speculate that changes in the non-coding elements in *NR5A2* gene's landscape may disrupt its transcription, which could create an auspicious environment to trigger PC. However, it is still unclear if enhancer disruption contributes to PC. Therefore, to gain a better understanding of how dysregulation of non-coding regions may impact PC development, this project aims to explore the regulatory landscape of *nr5a2*, using zebrafish as an in vivo model. **Methods:** Assay for Transposase-Accessible Chromatin with sequencing (ATAC-Seq) was used to analyze chromatin accessibility of *nr5a2* gene regions in zebrafish acinar cells, identifying putative acinar enhancers. Enhancer activity of the identified sequences was tested in zebrafish using Tol2 transposon based enhancer reporter assays via microinjection of one-cell-stage embryos. CRISPR-Cas9-induced genomic deletions targeting those putative enhancer regions were carried out concurrently. **Results:** Through ATAC-seq analysis, we found two candidate sequences with putative enhancer properties and successfully established stable transgenic and mutant zebrafish lines for both sequences. **Conclusions:** These findings will deepen our understanding in how non-coding regions affect PC development, which is important to better understand early PC development and its genetic susceptibility.

Keywords: Pancreatic Cancer, *Nr5a2*, Acinar Cells, Enhancers, Zebrafish.

21829 | Genomic Analysis of European Rabbit Strains: Optimizing Virus Identification for Hepatitis E Research

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Background & Aim: Hepatitis E virus (HEV) represents a significant global health concern due to zoonotic transmission. Of the eight known genotypes of *Paslahepevirus balayani*, genotypes 1 and 2 primarily affect humans, while genotypes 3 and 4 have a broader host range and are more associated with animal-to-human transmission. This study aims to investigate HEV genomic diversity using computational analysis tools and focusing on the European rabbit (*Oryctolagus cuniculus*) as a potential reservoir. **Methods:** The study began with a review of HEV genomic data and the primers available in the literature used for HEV detection in rabbit samples. Primers were extracted using a previously developed tool, which sorted the primers, considering melting temperature, GC content, folding, and conservation. New primers were designed considering an in-silico primer approach (iSOP tool) with a selection of those with a conservation score > 60. The top 10 primers will undergo experimental validation using PCR methods. **Results:** Analysis of rabbit HEV genomic sequences showed some degree of genetic similarity, with 46.2% identical sites and 83.8% pairwise identity. One hundred forty-five primers were retrieved from the literature, and 47 were obtained after primer filtering. The most promising pairs of primers retrieved from the literature showed median conservation scores between 85.1% and 91.4%, with amplicon sizes ranging from 673 to 973 base pairs. Additionally, 369837 in silico primers were obtained with similar scores varying between 82.1% and 83.9% and amplicon sizes ranging between 286 and 289 and 682 and 946 base pairs. **Conclusions:** Our study provides tools for a comprehensive analysis of HEV data, by screening genomic diversity, and optimizing primer

identification for accurate detection. This research could lead to progress in diagnostics and therapeutics for Hepatitis E infections, ultimately improving public health outcomes.

Keywords: European Rabbits, Hepatitis E Virus, Zoonotic Transmission, Genomic Diversity, Primer Design.

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21836 | Unraveling the role of cholinergic signaling in the increased neurite outgrowth promoted *in vitro* by synthetic cannabinoids.

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Background & Aim: Synthetic cannabinoids (SCs) are New Psychoactive Substances (NPS) that bind to cannabinoid receptors (i.e., CB1, CB2), and whose misuse by young adults (e.g., childbearing age, pregnant and lactating women) represent a high public health risk, due to the potential of causing neurodevelopmental disorders in their offspring. We previously showed that 2 SCs (5F-PB22, THJ-2201) increased neurite outgrowth in NG108-15 neuroblastoma x glioma hybrid cells via CB1 activation [1]. Here, we aimed to explore the signaling pathways underlying the SC-elicited increased neurite outgrowth. **Methods:** Neuronal differentiation of NG108-15 cells into a cholinergic phenotype was induced in serum-starved (1% fetal bovine serum) culture medium supplemented with 10 μ M forskolin and 10 μ M retinoic acid for 24h and 72h. Along with the start of differentiation, cells were exposed to biologically relevant concentrations (1nM and 1 μ M) of THJ-2201 (THJ) and ADB-FUBINACA (ADB). A vehicle control (0.02% DMSO) was also tested. We then analyzed the expression of acetylcholinesterase (AChE), choline O-acetyltransferase (CHAT), and soluble and membrane-bound catechol-O-methyltransferase (S- and MB-COMT) in total cell lysates, at 24 and 72h, by Western-blot. **Results:** Both 1nM and 1 μ M ADB increased AChE expression (1.250 and 1.180, respectively) at 72h, compared to the vehicle, in line with this SC-increased neurite outgrowth, as AChE is transiently expressed during neuritogenesis. Intriguingly, THJ did not affect AChE expression. Also, none of the SCs tested seemed to significantly affect COMT or CHAT. None of the SCs altered the referred proteins' expression at 24h. **Conclusions:** Overall, our preliminary data suggest that ADB-promoted neurite outgrowth seems to be associated with the modulation of cholinergic signaling. However, this mechanism was not shared by THJ, suggesting that distinct SCs may enhance neurite outgrowth by different pathways. Further studies are required to better understand the mechanisms underlying SC-induced neurodifferentiation.

Keywords: Synthetic Cannabinoids, Neuronal Differentiation, Molecular Signaling Pathways.

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21847 | The Role of Arctic Permafrost Microbiomes in Mercury Mobilization

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Background & Aim: Microorganisms are crucial to Earth's elemental cycles and understanding the impact of climate change on those communities is of paramount importance. The increasing temperatures are affecting permafrost thermokarst lakes, causing the release of the stored mercury (Hg) to the environment¹. Hg can be methylated, by specific microorganisms, into methylmercury (MMHg), a potent toxin that bioaccumulates and biomagnifies throughout the food chain, threatening humans' and other top predators' health. Hg methylation is driven by *hgcA* and *hgcB* genes, while its demethylation can occur by the action of *merA* and *merB* genes from the *mer* operon². This study aimed to explore seasonal variations (which can serve as predictors of climate change scenarios) in thermokarst lakes microbial communities, unveiling their role on Hg cycle pathways. **Methods:** We compared functional potential and taxonomic profiles of prokaryotes engaged in Hg methylation and demethylation pathways. Sediment samples were collected, in winter and summer of 2022, at three depths from two Canadian Arctic thermokarst lakes. After eDNA extraction, metagenomics analysis was performed using next-generation sequencing with Illumina technology and a specific pipeline (marky-coco & marky-coco-visualizer) to identify the genes of interest³. Downstream analysis was done using R Studio, integrating biological and environmental datasets. **Results:** The use of these tools allowed for the estimation of Hg-cycle associated gene coverage values and the establishment of the local prokaryotic communities' taxonomic profile. Overall, our findings revealed a high diversity of microorganisms capable of Hg methylation and demethylation in both lakes. We observed higher gene coverage and higher taxonomic diversity in winter, when compared to summer. **Conclusions:** Finally, these results highlight Hg cycle dynamics across seasons, which is critical for predicting how climate change will affect local microbial communities and anticipating environmental risks related to mercury release.

Keywords: Mercury, Permafrost, Methylation, Climate Change, Metagenomics.

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21855 | Characterizing electrophysiologic communication between neuronal populations with known architecture

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Background & Aim: The architecture of neural networks establishes how efficient they are [1], thus, comprehending the complex interactions between the two is crucial to understand the mechanics underpinning effective neuronal transmission of information. The goal is to build software tools to characterize the electrical communication between segregated populations of hippocampal neurons. **Methods:** This project uses different designs of asymmetric microchannels and microelectrode array (MEA) technologies, either retrieved from literature [2], namely arrowheads and tesla valves or custom variations of those. These were tested for their ability of replicating, in vitro, feed-forward architectures found, for example, on the hippocampus, where neurons assemble in organized layers with unidirectional connectivity [3]. As for the programming language, the previous work on it within the research group, made MATLAB the best option. **Results:** The number of spikes sequences in the electrodes of the microchannels is more than 3 times higher, on average, in the forward sense comparing to the backwards in every structure. Linear channels were associated with 50/50 relationships regarding spiking directionality, validating that structure motifs are responsible for the differences. The signal propagation through Network Bursts (NBs) happens with smaller delays in forward events and, for most cultures, NBs from the top population will drive more often NBs from the bottom one than the other way around. **Conclusions:** There's clear evidence that these structures effectively create a bias in signal propagation. Likewise, the presence of NBs driving NBs in the other population happened more frequent in the desired directionality. However, the structure with the best performance was the rams - custom variation of arrowheads - and, hence, should be the one used when mimicking feed-forward networks. Additionally, it remains as a challenge the creation of a 100% unidirectional network through these methods.

Keywords: Neurophysiology, Microelectrode array (MEA), Microfluidics, Feed-Forward architectures, Neuronal signal propagation

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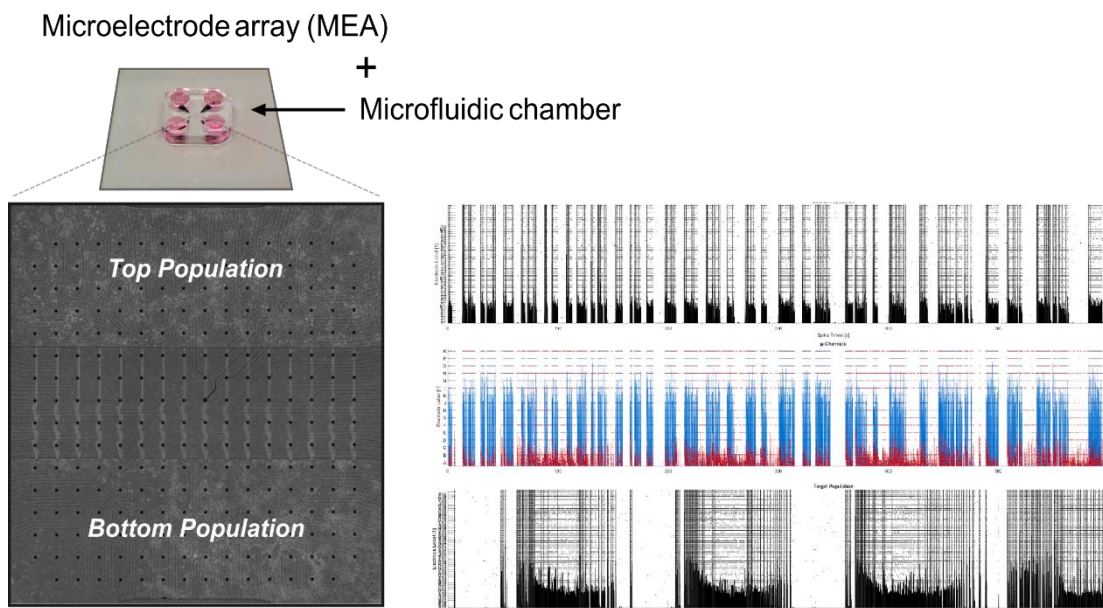


Figure 1: Brain on a Chip device combining MEA and microfluidic technology for neuronal population segregation. Left – Tiled phased-contrast image showing each population of primary cortical neurons (rodent origin) interconnected via 16 microchannels. Right – Activity raster plots and instantaneous firing rate for each population. Vertical lines in the raster plots of each population represent detection of NBs. Direction of action potential propagation along the microchannels is color coded in the middle panel.

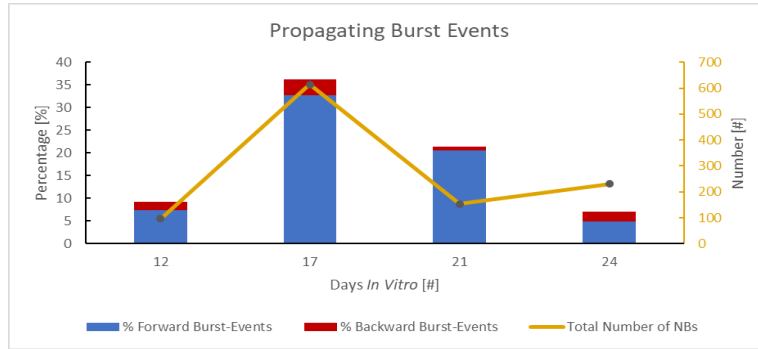


Figure 2: Longitudinal analysis of the Propagating Burst Events on one of the recordings associated with the Rams design in microchannels. Forward Burst events correspond to instances of source NBs preceding in an interval of [20, 500] ms target NBs. On the other hand, Backward Burst events are analogously defined.

21913 | *In vivo* reversion of progeria phenotypes by cyclic induction of the FOXM1 transcription factor

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The transcription factor Forkhead box M1 (FOXM1) is a key regulator of the cell cycle, playing an essential role in proliferation and maintenance of genomic stability. The expression of FOXM1 is gradually repressed during aging, resulting in the loss of proliferative capacity and the appearance of hallmarks of aging, such as cellular senescence. Restoring FOXM1 levels in human dermal fibroblasts from octogenarian healthy donors and patients with Hutchinson-Gilford progeria syndrome (HGPS) delays the accumulation of pro-inflammatory senescent cells, rescuing cellular aging phenotypes. Recently, *in vivo* induction of the FOXM1 transgene (FOXM1tg) in animal models of natural and progeroid aging was shown to delay senescence-associated histopathological features, extending mice lifespan by 25%. Although the induction of FOXM1tg in 4-weeks-old progeroid mice was efficient in delaying the establishment of premature aging phenotypes, it remains unknown whether FOXM1tg induction in older mice can reverse the progeroid phenotypes. Here, a HGPS mouse model was crossed with an inducible FOXM1tg mouse model to test different cyclic induction schemes starting at 4-, 8-, and 12-weeks-old. The early-age FOXM1tg induction scheme reaffirmed the delay of premature aging, in all phenotypes analyzed, namely lipodystrophy, kyphosis, and osteoporosis. Histopathology analyses of the skin, gonadal fat, and aorta also confirmed significant improvement of phenotypic features. In later induction schemes, FOXM1 overexpression rescues some progeroid phenotypes, namely the total adipose volume, kyphosis index, trabeculae thickness, and aorta wall thickness. This confirms that not only FOXM1 is able to delay the onset of progeroid phenotypes but it can also partially reverse those phenotypes once they are settled. We demonstrate FOXM1 ability to restore organismal fitness making FOXM1 a promising target for the treatment of progeroid syndromes and for the development of rejuvenation strategies.

Keywords: Aging, Cellular Senescence, FOXM1 Transcription Factor, Rejuvenation.

21960 | Elucidation of phenolic metabolites in colored wheat grains (*Triticum aestivum* L.) by HPLC-Orbitrap-MS/MS

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Background & Aim: The study aimed to compare the phenolic profiles of four colored wheat cultivars from the Czech Republic with conventional red wheat using a high-resolution mass spectrometry-based (LC-MS/MS) metabolomics approach. **Methods:** Wheat flour was subjected to phenolic extraction using 80% ethanol and 0.5% HCl, followed by centrifugation and repetition of the process with acidified ethanol and acetone. The combined supernatants were evaporated, underwent protein removal, and were filtered before solid-phase extraction. LC-MS/MS analysis was conducted on a Vanquish HPLC system, coupled to an Orbitrap Exploris 120 mass spectrometer. Parameters such as temperature, solvents, flow rate, and injection volume were set accordingly, and MS data acquisition included full scan and data-dependent MS/MS analyses with specific settings for confirmation. Single reaction monitoring (SRM) experiments targeting anthocyanin compounds were performed in positive ion mode, monitoring specific transitions for quantification. Compound Discoverer software (v. 3.3.1.111) was employed to process MS/MS data from real, and blank samples. **Results:** More than 100 metabolites were identified, and considerable differences were observed in flavonoid metabolites among five samples. Anthocyanin quantification by SRM also revealed significant differences in the chemical diversity of anthocyanin-rich *i.e.* purple, blue, and dark wheat varieties when compared to red and yellow grains, particularly in the content of cyanidin-, delphinidin- and petunidin-3-O-glucoside (**Table 1**). **Conclusions:** The results of this study not only enhance our understanding on the composition and distribution of phenolic compounds in grain tissues, but also lay a solid foundation on the functional and health-enhancing bioactivities of pigment-rich wheat varieties.

Keywords: Colored-Grain Wheat, High-Resolution Mass Spectrometry; Cereal-Omics.

Acknowledgments

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Table 1. Quantification of cyanidin 3-O-glucoside, delphinidin 3-O-glucoside, and petunidin 3-O-glucoside content (expressed in μg of anthocyanin per kilogram of dry weight matter) in pigmented and non-pigmented wheat flours. Data is presented as mean values \pm standard deviation.

Wheat variety	Grain color	Cyanidin 3-O-glucoside ¹ ($\mu\text{g}/\text{Kg}$ dry weight)	Delphinidin 3-O-glucoside ² ($\mu\text{g}/\text{Kg}$ dry weight)	Petunidin 3-O-glucoside ³ ($\mu\text{g}/\text{Kg}$ dry weight)
Bohemia	Red	2.5 \pm 0.9	5 \pm 2	1 \pm 1
Bona Vita	Yellow endosperm	<i>n.d.</i>	1.1 \pm 0.2	<i>n.d.</i>
AF Jumiko	Purple pericarp	47.0 \pm 2.4	22 \pm 1	3.0 \pm 0.1
AF Oxana	Blue aleurone	531 \pm 37	887 \pm 9	122 \pm 13
AF Zora	Black	1906 \pm 78	2438 \pm 175	380 \pm 7

¹ Linear correlation: XIC area = $7.42 \times 10^7 \times [\text{cyanidin 3-O-glucoside}]$ (0.001 - 10 $\mu\text{g}/\text{mL}$), $R^2 = 0.9953$, LOD = 1.14 $\mu\text{g}/\text{mL}$, LOQ = 3.47 $\mu\text{g}/\text{mL}$. ² Linear correlation: XIC area = $4.98 \times 10^7 \times [\text{delphinidin 3-O-glucoside}]$ (0.001 - 10 $\mu\text{g}/\text{mL}$), $R^2 = 0.9998$, LOD = 0.20 $\mu\text{g}/\text{mL}$, LOQ = 0.62 $\mu\text{g}/\text{mL}$. ³ Linear correlation: XIC area = $4.23 \times 10^7 \times [\text{petunidin 3-O-glucoside}]$ (0.001 - 10 $\mu\text{g}/\text{mL}$), $R^2 = 0.9999$, LOD = 0.15 $\mu\text{g}/\text{mL}$, LOQ = 0.45 $\mu\text{g}/\text{mL}$.

21969 | Ciliopathy-associated kinases regulate retrograde transport inside neuronal cilia

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Background & Aim: Cilia are microtubule-based protrusions present in most cells with critical functions in development, fertility, and sensory perception. Cilium assembly and maintenance are ensured by a bidirectional delivery system named intraflagellar transport (IFT). IFT is composed of two large protein complexes (IFT-A and IFT-B), known as IFT trains, that bind structural components and signaling molecules. IFT trains are transported by Kinesin-2 to the ciliary tip, and by Dynein-2 back to the ciliary base. Defects in IFT are associated with congenital diseases, commonly referred to as ciliopathies. Despite the clear importance of cilia to health, the underlying mechanisms of disease are unknown. Among ciliopathy-associated mutations are those in the Ciliogenesis Associated Kinase 1 (CILK1) and the Cell Cycle-related Kinase (CCRK). These kinases localize to the ciliary tip and are involved in ciliogenesis through yet unknown mechanisms. In this project, we aim to dissect the ciliary proteins and IFT events regulated by CILK1 and CCRK. **Methods:** We use *Caenorhabditis elegans* as a model where cilia play key functions in sensory neurons but, unlike in mammals, ciliary defects are compatible with animal survival. Importantly, CILK1 and CCRK homologs are present in *C. elegans*, known as DYF-5 and DYF-18, respectively. To study their function in cilia, we crossed knock-out mutants of these kinases with multiple GFP-tagged IFT components that we generated via CRISPR-Cas9 to compare their behaviour in the presence and absence of these kinases by fluorescence microscopy. **Results:** We find that Dynein-2 and IFT components accumulate at the ciliary tip of DYF-5/DYF-18-deficient cilia. **Conclusions:** These results suggest that DYF-5/DYF-18 have a critical role in the turnaround of IFT trains, potentially by facilitating the remodeling of IFT trains or the activation of Dynein-2 at the ciliary tip. Our work promises to increase our understanding of how mutations in CILK1 and CCRK lead to ciliopathies.

Keywords: Intraflagellar Transport; retrograde IFT; Dynein-2; *C. elegans*.

Acknowledgments

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21992 | Chemical-mediated interactions between cyanobacteria and amoebae

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Background & Aim: Cyanobacteria are photosynthetic organisms found in both aquatic and terrestrial ecosystems, and are known to be rich sources of potentially valuable secondary metabolites. Cultivation of individual species in laboratory conditions, with little or no competition/stress, hinders the expression of biosynthetic gene clusters (BGCs) and only reveals a small fraction of the metabolites synthesized in nature. Free-living amoebae are unicellular organisms ubiquitously present in the environment, known to co-exist and graze on cyanobacteria. Amoebae are often used as model organisms for parasitic protozoa such as *Plasmodium* and *Leishmania*, supporting the discovery of potential pharmaceuticals. The aim of this project is to identify new interactions between cyanobacteria and amoebae, focusing on the discovery of new chemical metabolites produced as a defense mechanism towards grazing.

Methods: A variety of cyanobacterial strains from the Blue Biotechnology and Ecotoxicology Culture Collection (LEGE-CC) of CIIMAR were co-cultured with different species of amoebae and screened through grazing plaque assays. Crude extracts showing activity towards amoebae will lead to selection of cyanobacterial strains for large-scale growth, compound isolation and structural elucidation. **Results:** We have screened over 150 cyanobacterial strains, and observed consistent resistance towards amoebae grazing in 10 unicellular strains and 9 sheathed colonial strains. This number will be further narrowed through other bioactivity assays. Remarkably, we found certain *Synechocystis* sp. strains that were grazed, while phylogenetically close strains to these ones were resistant. A different approach using comparative genomics may enable us to find undisclosed BGCs from these species. **Conclusions:** Based on the ecological interactions that cyanobacteria experience in the environment, we expect to develop new workflows for natural product discovery, while discovering novel compounds with potential pharmacological interest.

Keywords: Chemical Ecology, Cyanobacteria, Amoebae, Natural Products.

21995 | Using microbiome hints to assess marine environmental connection and impact on human health

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Background & Aim: Human microbiome (hMB) host trillions of symbiotic microbes and their gene products associated with physical and physiological functions [1]. Human microbiota and its derived microbial compounds are regarded as a link to health or pathogenesis of their host metabolism, promoting microbiota-targeted mediations intending to raise metabolic health [2,3]. Physical activity participates in shaping the hMB structure, diversity and produced metabolites [5]. Ocean sports practitioners (OSPs) incorporate seawater molecules and its microbial communities by the constant contact of their exposed epitheliums (skin, eyes, throat, ears). Thus, their microbiomes are expected to respond to environmental features in a specific way, different from people not so intimately connected to the ocean [6,7]. However, the direct bridge between the ocean and hMB is under-investigated. Here we hypothesize that active ocean users (OSP) could constitute a promising platform to translate the connection between marine environmental composition, including contamination, and human microbiome diversity. This study aims to explore if marine microbial communities, allied to environmental factors, participate in shaping specific human microbiomes in OSP; and as such, if those specific microbial communities evolve to a considerably different structure than in other active subjects that do not have frequent contact with the ocean (SP). **Methods:** Two groups (OSP and SP) of 50 subjects each were chosen according to exposure to Matosinhos sea and various factors associated with hMB colonization. Seawater samples were collected in 6 sampling points at Matosinhos sea and filtered with Sterivex 0.2 µm filters in the same period of sampling. Data from the eligibility form filled by each subject were analyzed and treated to avoid biased samples and obtain homogeneity between groups. **Results:** In total, 107 samples were collected, from which 35 belonged to women and 72 to men. 10 women and 43 men are OSP, while 23 women and 26 men do not practice any ocean-related activity. To be considered “surfer,” the subjects must practice surfing or any ocean-related activity for at least 3 hours per week. This way, those who did engage in ocean-related activities, but for a smaller amount of time, 2 women and 3 men, were considered “mix”. Information regarding probiotics, prebiotics and antibiotics usage was

also collected, as well as regarding smoking, diet, exercise, bowel movements and sexual activity. Until this point, we could observe a majority of smoking OSP males and we also recon that male OSP spend the most time in the ocean. However, we could not correlate any of the subject routine and health practices with the surfing activity. Moreover, it is noteworthy to mention that more people may still be sampled, and other information about each subject can also be gathered. **Conclusions:** Preliminary survey and data collection allowed to obtain background knowledge about human subjects in relation to their routine and health practices, which will be essential to integrate in the overall analyses of human and ocean microbiome 16S rRNA gene sequences.

Keywords: Active Ocean Users, Human Microbiome, Ocean Microbiome, Human And Marine Environmental Health.

Acknowledgments

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22013 | Identification of cyanobacteria and microalgae with bioactivities for metabolic diseases

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Background & Aim: Obesity is an emerging epidemic that affects millions of people every year and is associated with high-risk diseases such as cardiovascular disease and diabetes. There are treatments available, but not all of them are effective. The aquatic environment is a poorly studied resource and has great potential for the discovery of new natural compounds from organisms such as cyanobacteria and microalgae with promising biotechnological and biomedical applications. This work focuses on the search for cyanobacteria and microalgae organic extracts with bioactivities for potential metabolic disease treatments associated with obesity. **Methods:** Aqueous and ethanolic extractions of 19 different cyanobacteria and microalgae were done under different conditions: at room temperature without pressure and at 80°C with pressure (1500-1700 Psi). The 76 extracts were screened in phenotypic assays (lipid reduction, 2-NBDG, anti-appetite, and toxicity) using zebrafish larvae (n=6-8). The metabolic profile will be evaluated by liquid chromatography with tandem mass spectrometry (LC-MS/MS), in order to identify the compounds responsible for the bioactivity achieved. **Results:** The phenotypic assays are still ongoing, but first promising results were obtained. In the lipid reduction assay, the following extracts had statistically significant activity >30%: *Pavlova girans*, *Chaetoceros calcitrans* and *Skeletonema costatum* extracted with 96% EtOH and 80°C; *Nannofrustulum shiloi* extracted with H₂O and 80°C; *Chlorococcum sp* extracted with EtOH at room temperature. In the appetite assay, the following extracts decreased appetite >30%: *Scenedesmus spp* EtOH and 80°C; *Scenedesmus spp* and *Spirulina platensis* extracted with H₂O at room temperature. The extracts of *Spirulina platensis* and *Tetraselmis striata CTP4* EtOH and 80°C increased appetite for >30%. **Conclusions:** This work demonstrates that aqueous and ethanolic extracts from cyanobacteria and microalgae are a promising source of bioactive compounds for human metabolic diseases.

Keywords: Organic Extraction, Metabolic Diseases, Zebrafish, 2-NBDG Assay, Lipid Reduction Assay, Appetite Assays, Novel Compounds.

Acknowledgments

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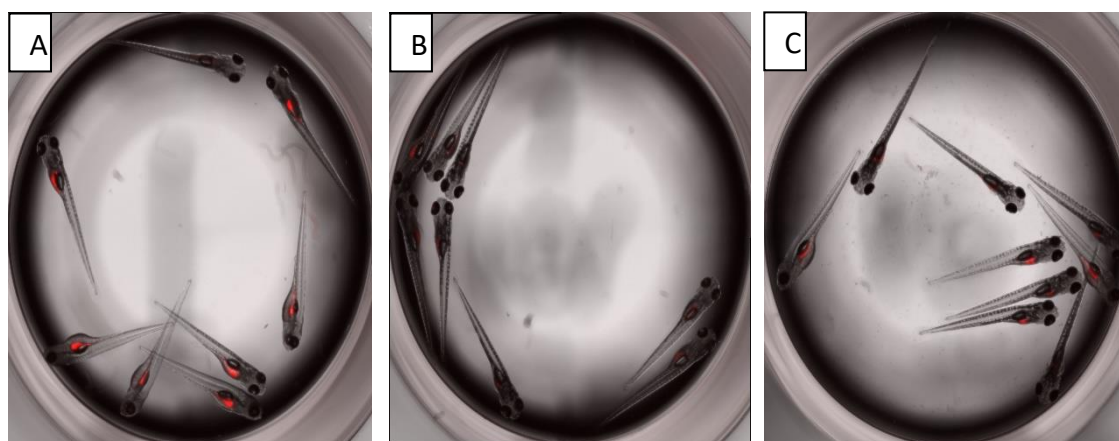


Figure 2- Anti-obesity assay stained with Nile red with lipid-reducing activity in extract A** using zebrafish as a model; (A) Solvent control, 0.5% dimethyl sulfoxide (DMSO); (B) Negative control, Resveratrol (REV, 50 μ M); (C) Extract of the microalga *Pavlova girans* automatically extracted with 96% ethanol

22039 | Deconstructing the glomerular kidney: a case of evolutionary parallelism in teleosts

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Background & Aim: The Bilateria ancestor evolved a nephron structure based on ultrafiltration through the glomerulus - a capillary network contained in the Bowman's capsule – and including a highly specific cell-type, the podocyte [1]. Strikingly, some fish lack these structures. Seven marine teleost lineages were previously classified as “aglomerular” on the basis of morphology, including Nototheniidae (Antarctic fishes) and Batrachoididae (Toadfishes) [2]. Recent *omics* studies uncovered the genetic basis of aglomerularism in Syngnathidae, outlining an association between gene loss and the change from a filtration system to an excretory mechanism [3]. **Methods:** Here, we explored the genetic basis of aglomerularism in toadfishes and Antarctic fishes. Mutational inference was performed from available genomes, using Pseudochecker and Geneious Prime software in order to investigate coding status in target genes. RNA extraction of a kidney sample from *Halobatrachus didactylus* (Lusitanian toadfish) was used to produce a de novo transcriptome. Gene expression analysis was performed as a proxy of functional analysis. **Results:** Our results revealed a clear mutational landscape in Batrachoididae across target genes. In contrast, gene sequence analysis in the aglomerular Nototheniidae showed no signs of gene loss. **Conclusions:** We propose that aglomerularity in toadfishes encompasses an energy-saving process, similar to that found in Syngnathids. In Nototheniids, the paradoxical retention of functional genes in species that are aglomerular, may stem from an ontogenetic process marked by glomerular presence in early larval development and loss in adults. A life in ice waters depends on antifreeze glycopeptides (AFGPs). These are not produced during larval stages, but are key in adults and would be filtered out in the case by the glomerulii [4]. This complex

evolutionary landscape emphasises the role of physiological plasticity in the generation of diversity which can be illuded by secondary gene loss [5].

Keywords: Gene Loss, Teleosts, Glomeruli, Kidney, Transcriptomics.

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22043 | Biochar-mediated remediation of Cu-contaminated soils: impacts on growth and physiology of lettuce plants

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Background & Aim: Soil contamination by copper (Cu) is a worldwide concern due to the extensive use of Cu-containing pesticides in agriculture, threatening food security and human health. Therefore, there is an urgent need for solutions to remediate Cu-contaminated environments and preserve soil fertility. Biochar has emerged as a promising green strategy to reduce metal-induced toxicity in crops. Thus, this study aims to evaluate the potential of biochar to mitigate Cu-induced stress in lettuce plants (*Lactuca sativa* L.). **Methods:** Following a bifactorial design, lettuce seedlings were grown for 15 days in agricultural soils contaminated or not with Cu (100 mg/kg), both with and without biochar amendment (2% m/m). The biochar used was derived from cork powder fly ash. **Results:** Cu exposure substantially inhibited plant growth and led to a reduction in total chlorophylls. On the contrary, biochar application significantly enhanced fresh biomass, root length and restored chlorophyll levels, even under Cu exposure. Oxidative stress markers showed no major changes in superoxide anion production in both organs, but increased hydrogen peroxide (H₂O₂) (roots) and lipid peroxidation degree (both organs) under Cu exposure. Still, these Cu-effects were efficiently mitigated by biochar, as plants co-exposed to Cu and biochar did not present any upsurge in reactive oxygen species or oxidative damage. Regarding the antioxidant response in leaves, varied among treatments. Under Cu exposure, proline (Pro) was increased, while glutathione (GSH) levels were decreased. In contrast, biochar supplementation restored Pro to control levels while further reducing GSH levels. **Conclusions:** These results suggest that plants co-exposed to Cu and biochar were able to maintain their redox homeostasis, thus supporting the observed effects on biomass production. Overall, highlights the potential of biochar as a green solution to alleviate oxidative stress and maintain plant health in soil contaminated by Cu.

Keywords: Biochar, *Lactuca Sativa*, Cu Contamination, Redox Metabolism.

22094 | Use of the low-cost microscope-MMR in secondary schools in Praia - Cape

Verde: a solution to the lack of laboratory equipment

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Background & Aim: Science education, a fundamental right according to the Universal Declaration of Human Rights (*United Nations*, 1948), is essential for the next generations, especially in countries such as Cape Verde, where theoretical classes predominate, generating learning difficulties and demotivation (Silva et al., 2021). Contrary to the Education Strategic Plan 2017 - 2021 (Ministry of Education, 2017), we experience a lack of laboratories in schools, leading to stagnation in science teaching. This lack of practical experience has a negative impact on the understanding of scientific concepts, limiting students' ability to apply the knowledge they have acquired (Cachapuz, 2023; Teles & Fonseca, 2019). Speaking of the microscope, an important teaching tool in the learning process and student performance (Das et al., 2021; Teles & Fonseca, 2019), its absence represents a significant challenge in students' understanding of certain content, such as levels of biological organisation (Das et al., 2021). **Methods:** This descriptive study recounts theoretical (lectures) and practical (workshops and visualisation) activities that took place from 12 to 24 January 2024 in seven secondary schools in Praia, using the MMR recycled material microscope. Data was collected through a questionnaire sent to 50 11th and 12th grade students using the Google Forms platform. **Results:** The practical activity with the MMR microscope received very positive evaluations, with the majority rating it "Excellent" or "Very good". Almost all the students (48 out of 50) said that the microscope met their performance expectations. Furthermore, the vast majority (49 out of 50) believe that the microscope would be useful for practical lessons in secondary schools. As for the possibility of making an MMR microscope to help their schools, the majority (35 out of 50) answered "Yes". **Conclusion:** The students showed great acceptance of the MMR microscope as an asset for science teaching in Cape Verde, leading us to believe that we could soon have many secondary schools using the microscope.

Keywords: Cape Verde, Reused Material, Science Teaching, Secondary Education, Practical Activities.

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22095 | Decoding bioaerosols in Antarctica: Microbial diversity in precipitation and surface snow

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The Antarctic Peninsula (AP) has exhibited a significant warming trend over the last 60 years (Jones et al, 2019). Coupled with the rising temperatures, an increase in precipitation and surface melt is being observed across the AP, with many major surface melt and precipitation events being associated with atmospheric rivers (ARs) (Gorodetskaya et al., 2023; Wille et al. 2021.) ARs, long corridors of intense moisture and heat transport from subtropical and mid-latitude regions poleward, typically carry liquid-containing clouds to the AP. Additionally, ARs can play a role in the long-range transport of aerosols. The aerosols, which serve as cloud condensation and ice nuclei, determine cloud microphysical properties and influence precipitation formation. Given that a substantial percentage of aerosols are of biological origin, it is crucial to effectively identify and describe them. Hence, we aim to characterize bioaerosols, specifically microorganisms, present in the precipitation and surface snow in the AP. Rainfall, snowfall and glacier snow samples were collected during PROPOLAR campaigns on King George Island, in the northern AP. The samples were preserved and analysed using culturable methodologies. A total of 28 bacterial strains were obtained and identified through 16S rRNA gene sequencing, providing information about the diversity and phylogenetic relationships of the identified microorganisms. The organisms were categorized into six genera, including those recognized for their ice nucleation abilities, such as the *Pseudomonas* genus (Attard et al, 2012). We identified four strains among those analyzed as potentially novel species affiliated with the *Spirosoma* and *Paenibacillus* genera. These findings highlight the untapped potential of these regions in harboring unique microbial biodiversity. Examination of microbial communities in Antarctic precipitation and glacier snow is crucial for understanding their impact on cloud condensation and ice nucleation processes, and the overall climate dynamics across the AP.

Keywords: Antarctic Peninsula, Atmospheric Rivers, Precipitation, Bioaerosols, Microorganisms.

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22125 | Communities of pollinating arthropods in the agroecosystems of São Tomé

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Background & Aim: One major threat to biodiversity is that ecosystems are being simplified by agricultural practices. Pollinating arthropods can be particularly sensitive to agricultural practices as they may specialize in a reduced number of plant taxa, often unavailable in agricultural fields. São Tomé Island is characterized by a high level of endemic species. Although ¼ of the land is protected, agriculture has historically been the country's economic foundation. Due to plantations of sugar cane, cocoa and palm oil, São Tomé lush rainforest has undergone severe degradation. Despite the recognition of the unicity of its fauna, little is known about the communities of pollinating arthropods of São Tomé and about the potential impacts of agroecosystems on them. Our objective was to understand how the biodiversity of pollinating arthropods is distributed among habitats and how much of natural communities is still harboured in monocultures. Specifically, we aimed to assess differences in taxa richness and composition across an environmental gradient of human intervention. **Methods:** We conducted a survey in four different habitats (villages, oil palm plantations, cocoa plantations, and forests) during 2022 and 2023, using four sets of pan-traps across twelve sites. Pan-traps target arthropod pollinators as they act as coloured baits. Each pan-trap had four coloured containers and was hung in trees for 24 hours. Specimens of each collected sample were morphologically identified. **Results:** We observed a total of 2,701 specimens, with the most represented orders being Diptera and Hymenoptera. Dipterans were predominant in the forest, while hymenopteran specimens were predominant in cocoa plantations. **Conclusions:** Overall, abundance seemed to vary according to habitat and different coloured plates seemed to differently attract some orders. This study is the first to document communities of pollinating arthropods on São Tomé Island and will serve as a baseline for future biodiversity assessments.

Keywords: Biodiversity, Pan-Traps, Pollinators, Agricultural Ecosystems.

22130 | Effect of Antidiabetic Drugs on Well-Differentiated Thyroid Carcinomas: An In Vitro Study

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Background & Aim: Thyroid cancer is the most common malignant endocrine neoplasia and 85% of the cases correspond to papillary thyroid carcinoma (PTC). Generally, PTC patients have a good prognosis, however, 10 to 15% of cases can evolve to a more aggressive state leading to recurrence and distant metastasis. Metformin and canagliflozin are drugs used in the treatment of diabetes, and some studies suggest that these drugs have effects on cancer cells. However, available data remains limited and controversial. The main aim of this project is to validate the hypothesis that metformin and canagliflozin could serve as a viable therapeutic option for PTC patients who don't respond to conventional therapies. **Methods:** Two PTC cell lines (TPC-1 and BCPAP, harbouring RET/PTC and BRAFV600E, respectively) and a non-neoplastic thyroid cell line (Nthy Ori 3-1) serve as the study model. We started by determining the drug concentration to assess variations in diverse cellular and molecular parameters including: proliferation, viability, apoptosis, cell cycle dynamics, metabolic activity, mitochondria and cell morphology, autophagy, migration, and protein expression. **Results:** When exposed to a range of concentrations of metformin(1-50 mM) and canagliflozin(1-50 µM), the viability of the three cell lines decreases, with a more pronounced decline at 48h post-treatment. Thus, following these results, concentrations of 40 mM for metformin and 40 µM for canagliflozin were chosen for further studies. We are now evaluating the effect of these drugs on cell cycle, mitochondria and cell morphology. We expect these analyses to confirm findings in literature for other cancer models: G0/G1 cell cycle arrest, mitochondrial structural dysfunction, and morphological changes. **Conclusion:** If these effects on cell lines are verified, and are in accordance with the literature for other tumour models, we can advance that these drugs can be considered for PTC therapy, particularly for PTCs that may evolve into more aggressive forms.

Keywords: Papillary Thyroid Carcinoma, Metformin, Canagliflozin, Metabolism, Cancer Therapy.

Acknowledgments

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22088 | Shaped by gene loss: Evolutionary determinants for the inactivation of *DHDH* in Cetacea

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Background & Aim: Cetaceans, the iconic group of whales, dolphins, and porpoises, are unique among mammals. The transition from land to water around 50 million years ago, resulted in drastic morphological, physiological, and behavioural changes, as they adapted to new ecological niches [1]. Among the molecular mechanisms promoting adaptation, gene loss appears to be particularly relevant throughout cetacean evolution [2] [3]. In this study, we aim to assess the evolution of a gene called dihydrodiol dehydrogenase (*DHDH*) in cetaceans. *DHDH* encodes an enzyme belonging to the family of Gfo/Idh/MocA-like oxidoreductases. *DHDH* catalyzes the NADP-linked oxidation of certain aromatic compounds, like polycyclic aromatic hydrocarbons (PAHs), to corresponding cathecols; and are involved in the metabolism of xenobiotics and dietary sugars [4]. **Methods:** Using a well-established pipeline for gene coding status inference [5] [6], we evaluated and validated possible open-reading frame (ORF) disrupting mutations in *DHDH* of 18 selected cetacean species. **Results:** Our analysis reported the pseudogenization of this gene in all Mysticeti (baleen whales) species analysed, with conserved mutations in exons 3 and 4. For Odontoceti (toothed whales), *DHDH* erosion is observed, with partial or complete absence of the gene in different species. **Conclusions:** These results point to the possible loss of gene function amidst the transition from plant to low-carbohydrate meat-based diets in cetaceans, associated with a distinct sugar usage. Yet, the erosion of a xenobiotic-related gene in cetaceans is of utmost importance, considering the susceptibility of these keystone species to anthropogenic contaminants. Considering this, we emphasize the need for more studies on the chemical defensome of cetaceans to better protect these species.

Keywords: Cetaceans, Gene Loss, Dhdh, Sugar, Xenobiotics.

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CHEMISTRY

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21368 | Discovery of potent positive allosteric modulators of the D₂ receptors by stapling amantadine to melanostatin neuropeptide

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Background & Aim: Melanostatin (Figure 1) is a short endogenous neuropeptide that acts as a positive allosteric modulator of the D₂ receptors. Previous studies showed that this neuropeptide has potential for the treatment of dopamine-related disorders, such as Parkinson's disease. However, the peptide nature of melanostatin hinders its application as an orally available pharmaceutical. In this work, a conjugation strategy to improve the lipophilicity of melanostatin is described by exploring the lipophilic bullet approach. **Methods:** Amantadine was selected for conjugation at the C-terminal residue of melanostatin neuropeptide through a peptide bond (Figure 1). To this end, classical peptide chemistry was employed and the target conjugates were characterized by spectroscopical (NMR) and spectrometric techniques (HRMS). The conjugates were then pharmacologically evaluated by cAMP mobilization assays using transfected mammalian cells and toxicologically evaluated upon incubation with differentiated SH-SY5Y cells using the MTT reduction assay. To assess lipophilicity, the determination of the partition coefficient was performed through the classical shake-flask method and compared to *in silico* predictions. **Results:** The data from the pharmacological assays showed that conjugates **1** and **2** promote a 3.3- and 4.9-fold increase in dopamine potency, respectively, at 0.01 nM. In this assay, melanostatin was only active at the highest concentration tested (1 nM). Cytotoxicity assays showed that both melanostatin and conjugate **2** exhibited mild but statistically significant toxicity at 200 µM, while conjugate **1** was found to be nontoxic at that concentration. While conjugate **2** displayed a higher affinity for the organic phase than melanostatin in the shake-flask method, the partition coefficient was not determined for conjugate **1** due to the high turbidity of the aqueous phase. **Conclusions:** In this work, it has been demonstrated the chemical conjugation strategy of melanostatin with adamantane at the C-terminus of melanostatin resulted in peptide-

conjugates with enhanced pharmacological activity and overall lipophilicity. Altogether, the data opens a new avenue for the development of new anti-Parkinson hit compounds with a safe therapeutical window.

Keywords: Amantadine, Melanostatin, Parkinson's Disease, Positive Allosteric Modulators.

Acknowledgments

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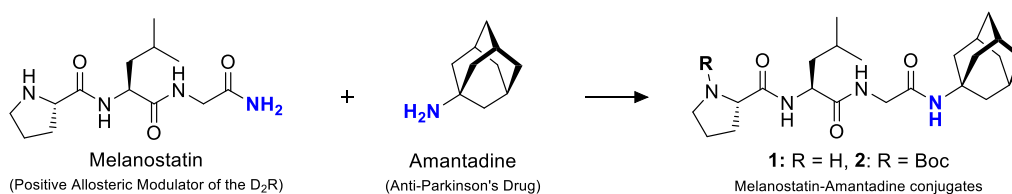


Figure 1: Molecular structure of melanostatin, amantadine, and conjugates **1** and **2**.

21378 | Quercetin attenuates silver nanoparticle-induced toxicity in intestinal cells

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Background & Aim: Silver nanoparticles (AgNP) have become ubiquitous in our daily lives, finding extensive application across various products prompting concerns about their safety, particularly with regard to their effects on the gastrointestinal system [1]. Therefore, it is imperative to identify compounds capable of mitigating any potential toxic effects induced by AgNP. Quercetin, a well-known flavonoid renowned for its antioxidant and anti-inflammatory properties [2], emerges as a promising candidate for this purpose. Therefore, our study aims to investigate the *in vitro* effects of 50 nm AgNP coated with polyvinylpyrrolidone (PVP) or citrate on an intestinal epithelium cell line (C2BBe1). Furthermore, we endeavor to explore the potential protective effects of quercetin against the adverse effects induced by AgNP. **Methods:** To achieve this goal, we employed two key methodologies: 1) 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) reduction, to assess cell viability; 2) and the Griess reaction method to assess the production of nitric oxide (*NO). **Results:** This study revealed that in the presence of both PVP or citrate-coated 50 nm AgNP, intestinal cells decreased their metabolic activity, an effect that was more prominent when exposed to PVP-coated AgNP. Additionally, it was observed an increase in *NO levels in intestinal cells exposed to PVP-coated AgNP, in contrast with the citrate-coated AgNP exposed cells. Moreover, the co-administration of PVP and citrate-coated AgNP with quercetin attenuated the negative effects of both AgNP in metabolic activity and restored *NO levels close to those of the control values. **Conclusion:** The findings from our study indicates that quercetin protects intestinal cells against the detrimental effects of AgNP. Overall, this study highlights the potential of quercetin as an asset in safeguarding gastrointestinal health against nanoparticle-related hazards, opening avenues for innovative therapeutic strategies.

Keywords: Intestinal Cells, Silver Nanoparticles, Quercetin, Metabolic Activity, Nitric Oxide.

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Funding: This work received financial support from national funds (FCT/MCTES, Fundação para a Ciência e Tecnologia and Ministério da Ciência, Tecnologia e Ensino Superior) through the projects UIBD/50006/2020 and UIDP/50006/2020. Additionally, Adelaide Sousa thanks FCT (Fundação para a Ciência e Tecnologia) and ESF (European Social Fund) through POCH (Programa Operacional Capital Humano) for her PhD grant reference SFRH/BD/150656/2020. Marisa Freitas acknowledges her contract under the Scientific Employment Stimulus - Individual Call (CEEC Individual) 2020.04126.CEECIND/CP1596/CT0006 and also thanks to LAQV/EQUIMTE her contract under the reference LA/P/0008/2020.

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Secreted Phospholipases A₂

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Background & Aim: Secreted phospholipases A₂ (sPLA₂) are key enzymes found in animal venoms, exerting a multitude of envenoming effects. Despite its ubiquity, the impact of sPLA₂ varies significantly among different phyla. While snake venom PLA₂ (svPLA₂) and bee venom PLA₂ (bvPLA₂) share conserved catalytic mechanisms, they exhibit distinct modes of action and target specificity. Notably, the inhibitor Varespladib efficiently targets svPLA₂ *in vitro* but lacks activity against bvPLA₂ [1]. That said, this study provides an extensive structural assessment aimed at elucidating the differences between snake and bee sPLA₂ enzymes, thereby shedding light on the variations in inhibitor efficiency and envenoming effects. **Methods:** To fully understand the structural differences molecular docking was employed to predict the binding pose of Varespladib on the active site of five different svPLA₂ enzymes and a bvPLA₂ enzyme. Subsequently, molecular dynamics (MD) simulations were performed to evaluate the complex PLA₂: Varespladib stability in solution. Moreover, molecular dynamics simulations were conducted on a complex consisting of bvPLA₂ and a POPC/POPS cellular membrane to elucidate their interaction and to compare it with prior findings [2]. Concurrently, quantum mechanics/molecular mechanics (QM/MM) simulations are in progress to assess the action mechanism of bvPLA₂. **Results:** As expected, the binding conformation of Varespladib observed for svPLA₂ enzymes significantly varies from that of bvPLA₂, primarily due to spatial constraints within the hydrophobic channel, limiting the ligand's potential flexibility. Additionally, the structural disparities between bvPLA₂ and svPLA₂ result in notable differences in its membrane positioning and subsequent interaction. **Conclusions:** This work stings the status quo of antidote searching with newfound insights into the distinct modes of action and ligand interactions of bee and snake sPLA₂ enzymes.

Keywords: Venom, Phospholipase A₂, Molecular Dynamics, QM/MM.

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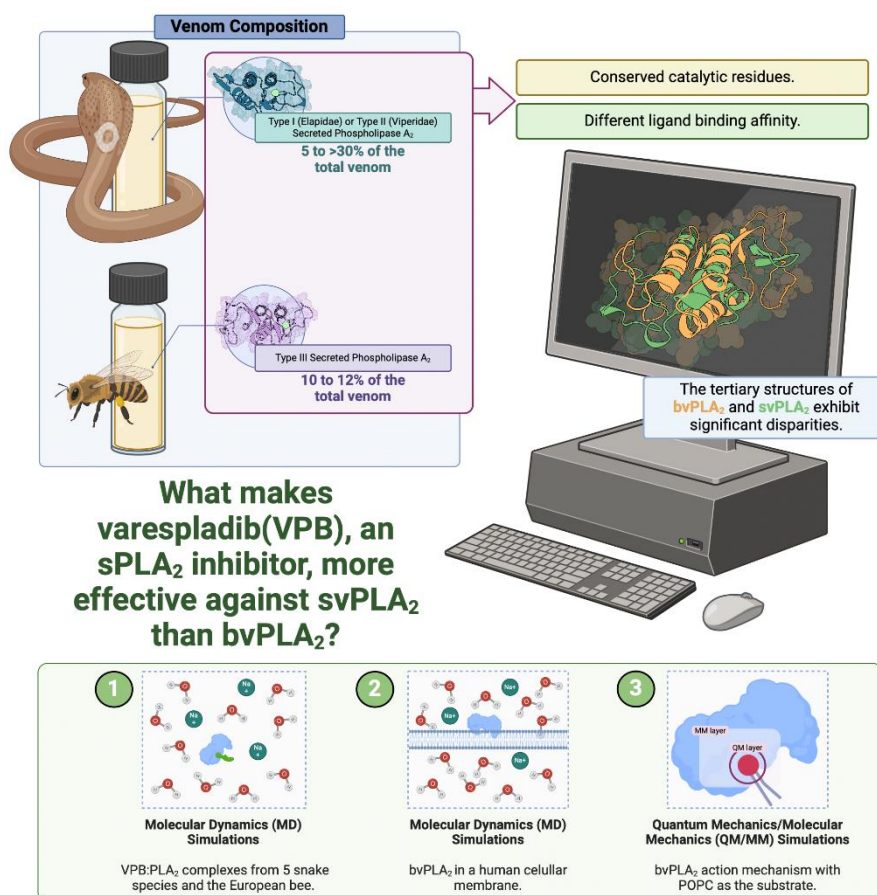


Figure 1: Graphical abstract highlighting the primary aspects of this study. Created with BioRender.

21476 | Chiral flavonoid derivatives: synthesis and structure elucidation of new potential antitumour agents

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Background & Aim: Chirality is an intrinsic property of several natural products, which can affect their biological effects.¹ It has been suggested that the insertion of chiral building blocks, namely amino acids, can ameliorate safety and efficacy profiles of bioactive natural products, particularly in flavonoids.¹ Flavonoids are polyphenolic compounds with assorted therapeutic applications, including antitumour.² On account of that, this project aimed to synthesize chiral derivatives of flavonoids (CDF), with amino esters and amino acids proceed with their structure elucidation and assessment of their enantiomeric purity. **Methods:** The intended compounds were obtained via chiral pool approach and, subsequently, the structure was elucidated by IR, ¹H and ¹³C NMR and HRMS techniques. Following that, their enantiomeric purity was evaluated through chiral high-performance liquid chromatography (cHPLC). **Results:** The chiral pool approach enabled the synthesis of nine new CDF with phenylalanine, valine and cysteine amino esters and the corresponding amino acids with chemical yields between 61% and 93%. Moreover, all structure elucidation techniques corroborated the success of the obtaining of the compounds, except for CDF with cysteine amino ester, in which HRMS data suggested the occurrence of dimerization. Furthermore, all compounds were acquired with high enantiomeric purity, with a range of values between 97% and 99.9%. **Conclusions:** Nine new CDF with amino esters and the corresponding amino acids were synthesized and their structures were elucidated. Additionally, cHPLC studies demonstrated that all compounds were obtained with high enantiomeric purity. Henceforward, it would be interesting to perform biological assays in order to evaluate their potential as antitumour agents as well as to determine the influence of the chirality in their activity. Moreover, mechanism of action studies should be carried out for the most promising compounds along with structure-activity relationship assessment.

Keywords: Enantiomers, Enantioselective Synthesis, Flavonoids, Chiral Derivatives of Flavonoids.

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21502 | Effective photocatalytic degradation of Rhodamine B in water by innovative hybrid nanomaterials

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Background & Aim: In recent years, the presence of persistent pollutants in consumable and residual water is a global environmental problem. Especially synthetic dyes used in various industries, including textile and paper, can either alter the chemistry of water (pH, turbidity) or introduce harmful chemicals into wastewater [1]. Solar light-induced photocatalysis is very promising process to solve this problem by promoting the oxidative degradation of organic pollutants [2]. **Methods:** In this work, new hybrid nanomaterials based on multiwalled carbon nanotubes (MWCNTs) functionalized with the visible-light photoactive Bi₂S₃ semiconductor and magnetic MnFe₂O₄ nanoparticles were developed and applied as photocatalysts for the degradation of the model dye - Rhodamine B (RhB), Figure 1. The MWCNTs were previously oxidized with HNO₃ and then, MnFe₂O₄ and/or Bi₂S₃ nanoparticles were *in situ* grown onto the oxidized MWCNTs (ox-MWCNT) surface to produce the three-component nanohybrids. The structure, morphology and composition of all prepared nanomaterials were characterized by several techniques, namely XRD, SEM-EDS, TEM, XPS and Raman spectroscopy. The adsorption (in the dark) and photocatalytic (under visible light irradiation, 150 W) performance of the hybrid materials and of their individual counterparts were evaluated in the removal of RhB in the absence and presence of H₂O₂ by UV-Vis spectroscopy. **Results:** The Bi₂S₃@MnFe₂O₄@ox-MWCNT material could generate reactive oxygen species under visible light irradiation (confirmed by EPR) and degrade 97% of RhB in 30 min (confirmed by ¹H NMR). The photocatalyst could be re-used for at least 3 times without activity lost. The XRD pattern of Bi₂S₃@MnFe₂O₄@ox-MWCNT maintained unchanged after the last catalytic cycle, suggesting the stability of the catalyst structure. **Conclusions:** The characterization techniques confirmed the successful preparation all materials. The Bi₂S₃@MnFe₂O₄@ox-MWCNT had the best photocatalytic performance (97% of degradation of RhB).

Keywords: Hybrid Nanomaterials, Carbon Nanotubes, Photocatalysis, Persistent Pollutants, Photo-Fenton Like Process.

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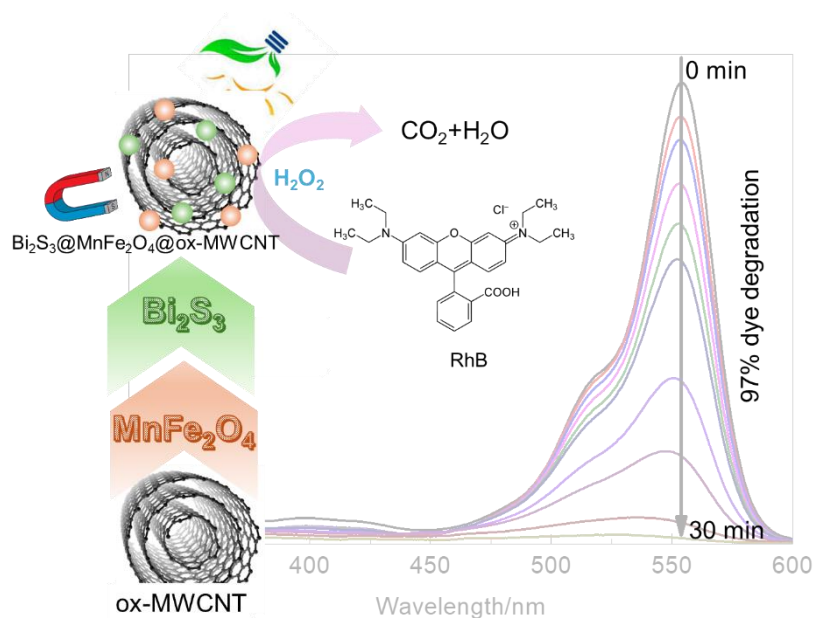


Figure 1: Photocatalytic degradation of RhB promoted by Bi₂S₃@MnFe₂O₄@ox-MWCNT.

21504 | Development of vegan and clean label ham-like products: more sustainable and healthier food products

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Background & Aim: In a world where the lack of resources expected to meet the demands of a growing population is increasingly evident, plant-based meat analogues can be seen as part of the solution to ethical, environmental, and health concerns. By-products of vegetable and fruit industry are a rich source of protein and bioactive compounds such as dietary fibers and polyphenols. As described in literature, these can be used as technological ingredients (e.g. thickening agents, emulsifiers, or colouring agents), while providing health benefits [1]. The main objective of this work was the development of an innovative vegan ham-like product that allied multifunctionality, while contributing to the circular economy, by incorporating fruit flour and vegetable proteins in its formulation. **Methods:** The ham-like formulation was tested with different plant-based flours and plant-based protein sources, like pulses, starchy roots and yeast derived protein. Acceptability, texture, and colour parameters were assessed for the most promising formulations. The polyphenolic profile of selected formulations' plant-based flours was analysed by HPLC-DAD and LC-MS/MS. The nutritional profile of these formulations was characterized by AOAC methods. The aminoacids profile and protein digestibility of selected formulations was assessed by PDCAAS assay. Polyphenols bioaccessibility assays were performed. **Results:** Formulations with starchy roots and yeast derived proteins showed similar texture and colour to control. The new formulations were preferred to the control in the acceptability trial. Total Anthocyanin Content (TAC) of plant-based flours from red fruits ranged from 0,093mg/g to 0,727mg/g. Total Phenolic Content (TPC) of plant-based flours from red fruits ranged from 8,3 to 33,4 mg GAE/g DW. Blackberry flour presented the higher TAC and TPC. **Conclusions:** Starchy roots and yeast derived proteins, along with red fruit flours, are a promising option to formulate and achieve a high-quality vegan ham-like product.

Keywords: Ham-Like Products, Polyphenols, Dietary Fibers, Plant-Based Alternative Proteins.

Acknowledgments

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21509 | Functionalization of textile substrates with bioactive compounds from by-products of different industries

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Background & Aim: The textile industry currently relies heavily on synthetic functional additives to add color and functionalities to the textile substrates, rather than using more sustainable options from natural origin. The use of these synthetic compounds can lead to issues, such as toxicity, carcinogenicity, the presence of residual color and high levels of electrolytes in wastewater¹. This work explores the use of waste and by-products from different industrial sectors in the textile industry, as more sustainable alternatives to synthetic additives, in order to provide antioxidant and/or antibacterial activity to textile substrates. Additionally, this approach allows the natural dyeing of the textile substrates. **Methods:** Various residues, including hops, eucalyptus, and grape pomace, in varied granulometries, were subjected to chemical extraction processes, through aqueous or alkaline (sodium hydroxide solution and ethanol) extraction, to obtain polysaccharides and polyphenols. The resulting extract was characterized regarding its phenol content, antioxidant, and antibacterial properties. After characterizing the extracts, those with the greatest potential were used to functionalize knitted cotton fabrics through impregnation and exhaustion. **Results:** Among the various explored residues, the alkaline extraction of hops and eucalyptus proved to be the most promising, conferring antibacterial activity to the textile substrates (Figure 1). The cotton fabric functionalized with eucalyptus extract also exhibited high antioxidant properties even after one washing cycle. **Conclusions:** The use of wastes and by-products from other industries have made it possible to obtain new, bio-based, more sustainable functional ingredients as a replacement for synthetic compounds, while reusing waste from other industrial sectors.

Keywords: Waste, Sustainability, Antimicrobial, Antioxidant, Textile Functionalization, Bioactive Compounds.

Acknowledgments

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Figure 1: Qualitative antibacterial test on knitted cotton fabric pre-treated with chitosan (Quito) and cationic agent (CAT) and functionalized with alkaline hop extraction, revealing antibacterial activity against *S. Aureus*.

21541 | Design and synthesis of amphiphilic compounds derived from proline and proline mimetics as potential transdermal drug delivery systems

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Background & aim: Transdermal drug delivery offers numerous advantages over the oral and parenteral drug delivery routes such as avoidance of gastrointestinal and liver first-pass effects, being painless, non-invasive, easy to use and sustained drug release presenting this way enhanced patient compliance¹. The administration of drugs through the skin is still, however, hampered by the low permeability of the uppermost skin layer, the *stratum corneum* (SC). Over the past few years, the use of chemical permeation enhancers (CPEs) has emerged as a promising methodology to improve transdermal permeation since these compounds induce a temporary and reversible increase in skin permeability². Amino-acid based amphiphiles have been studied and proven to be an effective class of biocompatible compounds with low cytotoxicity, high activity as CPEs and reversibility^{3,4}. **Methods:** The compounds obtained (intermediates and final) were purified by liquid-liquid extraction and/or by silica gel column chromatography and characterized by NMR and mass spectrometry. **Results:** A total of six double-chained amphiphilic compounds have been synthesized: five derived from 4-hydroxyproline and one proline mimetic. Concerning gemini derivatives a total of six precursors were obtained. **Conclusions:** The synthetic routes for the obtention of double-chained/gemini compounds derived from 4-hydroxyproline and cyclic β -amino acids (proline-mimetics) have been established.

Keywords: Chemical Permeation Enhancer, β -amino Acid, *Stratum Corneum*, Hydroxyproline.

Acknowledgements

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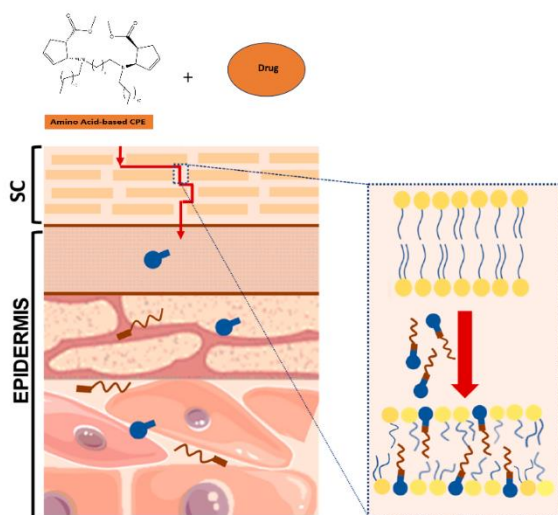


Figure 1: Representation of the mechanisms of action of CPEs, adapted from reference 1.

21562 | Production and characterization of yeast protein extracts and hydrolysates for application in the food industry as flavour enhancers

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Background & Aim: With the growing interest in vegetarian and vegan diets, alternative proteins have been a focus in the food industry. In this reality, yeast proteins arise as an economical, nutritionally rich, and environmentally friendly alternative, with numerous properties and food matrix applications. In collaboration with Proenol S.A., the use of a *Saccharomyces cerevisiae* protein extract was studied for its gustative potential. Since umami taste is hard to obtain in plant-based food, and peptides smaller than 3 kDa are described as having umami potential, a process of hydrolysis could be key to obtain umami flavour enhancers from yeast proteins.

Methods: Enzymatic protein hydrolysis was optimized testing different yeast protein extracts and byproducts as well as two food-grade proteolytic enzymes (an *Aspergillus oryzae* protease and a *Bacillus amyloquefaciens* protease, each one tested from two different suppliers, to perform scale-up tests with the enzyme used at the industrial level), reaction times, temperatures, and enzyme concentrations. The hydrolysates were analysed and characterized through HPLC, HPLC-SEC and LC-MS/MS to study which condition potentiates the gustatory properties of peptides.

Results: After conducting tests under different conditions, we observed that hydrolysis is affected by the presence of salt, and a temperature of 50°C is optimal for the enzymes under study. It was found that the enzymes sourced from different suppliers present a similar behaviour at high reaction times. This data is of extreme importance since it means a correlation between laboratory experiments and industrial production, crucial to the development of the final product by Proenol S.A. **Conclusions:** It was shown that the yeast protein extract in study presents gustative potential when hydrolysed with specific proteases, which allows the production of umami tasting peptides. These peptides can then be added to a food matrix to generate umami flavour in a healthy and vegan-suitable manner.

Keywords: Yeast Protein, Hydrolysis, Umami.

21596 | Lipophilicity assessment of antifouling substances

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Background & Aim: The undesirable accumulation of micro- and macro-organisms in submerged structures, known as biofouling, is a major global problem. One of the most widely used methods to prevent biofouling is the application of coatings containing biocides. However, their use has raised some concerns due to the persistence and bioaccumulation potential of these biocides [1]. The most important physicochemical property for predicting bioaccumulation is lipophilicity. Lipophilicity can be assessed using various methods and is commonly expressed as the logarithm of the partition coefficient between the octanol and water phases ($\log P_{o/w}$) [2]. In this work, we used *in silico* and experimental methods to evaluate the $\log P_{o/w}$ of to predict their tendency to bioaccumulate. **Methods:** The data set included nine reference substances (with known $\log P$ values), six commercial biocides, and eight compounds synthesized by our research group [1;3-5]. *In silico* $\log P_{o/w}$ values were predicted using fifteen different models. Experimental $\log P_{o/w}$ values were determined by reversed-phase high-performance liquid chromatography (RP-HPLC) and vortex-assisted liquid-liquid microextraction (VALLME). In addition, the partition coefficient for all substances was also determined between the micelle and seawater phases ($\log P_{m/w}$) using derivative spectroscopy. **Results:** The $\log P_{o/w}$ values calculated *in silico* showed great variability between the different prediction models. The $\log P_{o/w}$ values determined by RP-HPLC were congruent with those obtained by *in silico* methods. The $\log P_{o/w}$ values determined by VALLME were accurate, but this method was only suitable for half of the substances under study. The $\log P_{m/w}$ values were generally higher than the corresponding $\log P_{o/w}$ values due to the different types of interactions assessed by the different models. **Conclusions:** The data obtained highlight the importance of determining the partition coefficient with different complementary methods.

Keywords: Bioaccumulation, Lipophilicity, Coefficient Partition.

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21602 | Green chemistry in the organic synthesis of a new antifouling compound

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Background & Aim: Marine biofouling poses significant challenges for the maritime industry worldwide. The colonization of micro- and macro- organisms on submerged surfaces requires considerable investments. While biocides incorporated into marine coatings have been effective in preventing biofouling, it is crucial to recognize their persistence, bioaccumulation, and potential toxicity to unintended marine organisms. Given the economic, environmental, and human health implications, it is crucial to prioritize the development of novel, environmentally friendly alternatives, namely nature-inspired antifouling compounds (NIAFs) [1]. **Methods:** In this direction, a responsible production (SDG-Sustainable Development Goal 12) was planned to synthesize NIAFs, choosing less toxic and inherently safer chemicals, selecting alternative solvents and reaction conditions. **Results:** This work enabled the optimization and scale-up of the synthesis of a new eco-friendly antifouling compound (GBA26) [2] [3] towards green chemistry. **Conclusions:** The feasible production of GBA26 developed in this work, adding to its environmental compatibility, puts forward the potential of GBA26 to replace toxic additives used in marine antifouling coatings (SDG14).

Keywords: Antifouling, Green Chemistry, Scale-Up.

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21613 | Morphology and Wettability of Thin Films of Ionic Liquid Mixtures on Solid Surfaces

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Background & Aim: Numerous studies have been conducted on the application of thin films of ionic liquids (ILs) across various domains¹ due to their distinctive physical and chemical properties, such as low vapor pressure, excellent thermal stability, and impressive wettability characteristics.²⁻⁴ Currently, there is a growing focus on studying IL mixtures and exploring the synergistic effects they exhibit. In this work, we studied the morphology of films composed of a mixture of two ILs, [C₂C₁im][OTf] and [C₈C₁im][OTf], co-deposited through vacuum thermal evaporation, by varying the film composition and thickness. Furthermore, the IL mixture films were explored as solvents under vacuum to enhance the crystallinity of rubrene, one of the most promising organic semiconductors. **Methods:** The deposition was conducted using physical vapor deposition (PVD).⁵ The IL mixture was deposited on three surfaces: indium tin oxide (ITO); ITO coated with silver (Ag); and ITO coated with gold (Au). Scanning electron microscopy (SEM) was employed to examine the adsorption, nucleation, and film growth processes of different mixtures, and X-ray diffraction (XRD) was used to evaluate the crystallinity of rubrene films fabricated by IL-assisted PVD. **Results:** On the Au surface, a higher proportion of C₈C₁im resulted in the formation of a fully coalesced film. On ITO and Ag surfaces, the formation of droplets was noted; an enrichment of C₈C₁im in the mixture contributed to the formation of droplets with lower contact angles. Depositing rubrene onto surfaces coated with pure ILs resulted in an enlargement of the crystallite size. Notably, in equimolar mixtures of [C₂C₁im][OTf] and [C₈C₁im][OTf], even higher crystallinity was observed. **Conclusions:** The proportion of each IL in the mixture, as well as the surface type, significantly affected the film morphology. Metal surfaces exhibited very good wettability by IL mixture films enriched with [C₈C₁im][OTf]. These films have been shown to enhance the crystallization of rubrene.

Keywords: Ionic Liquids, Thin Films, Wettability, Crystallinity.

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21672 | Computationally unraveling the multienzyme human fatty acid synthase

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Background & Aim: Membrane integrity, signal transduction and energy source: fatty acids are indispensable in the human body [1], and the *de novo* biosynthesis of their saturated C₁₆-C₁₈ chains is carried out by the homodimeric multienzyme human fatty acid synthase (hFAS).[2] Since typical western diets demand almost no fatty acid synthesis, FAS expression is usually linked to diabetes or even cancer [1]. To battle these diseases at the molecular level, it is imperative to understand the chemical pathways FAS undertakes. Elongating the fatty acid intermediate with an acyl group, the reaction on the β -ketoacyl synthase (KS) domain is a crucial step, yet one that still has not been fully determined mechanistically [2]. In order to unravel the catalytic machinery of this 5000 amino acid long protein, one needs to create a realistic computational model of the seven domains per chain, where the acyl carrier protein (ACP) is stationed near the KS. **Methods:** Through homology modeling, ACP was placed close to the KS domain, near its previously proposed catalytic His, Cys and Phe residues [2]. Limiting ACP's mobility, its 257-atom long linker connected to the rest of the enzyme, through the keto reductase (KR) domain, can therefore be modeled manually to facilitate this placement. **Results:** Currently, molecular dynamics simulations are being performed on the model shown in **Figure 1**. Under the influence of the mobile thioesterase (TE) domain effectively 'pulling' on ACP, it is hypothesized that the binding tendency of ACP:KS can be determined. **Conclusions:** This is a promising starting point for further research of the chain elongation in the KS domain, where QM/MM (quantum mechanics/molecular mechanics) methods can be used in synergy to uncover the reaction mechanism of this important step, guaranteeing more insight in the human body and an effective playing field in battling diabetes and cancer.

Keywords: Fatty Acid Synthase, Enzyme, Homology Modeling, Molecular Dynamics.

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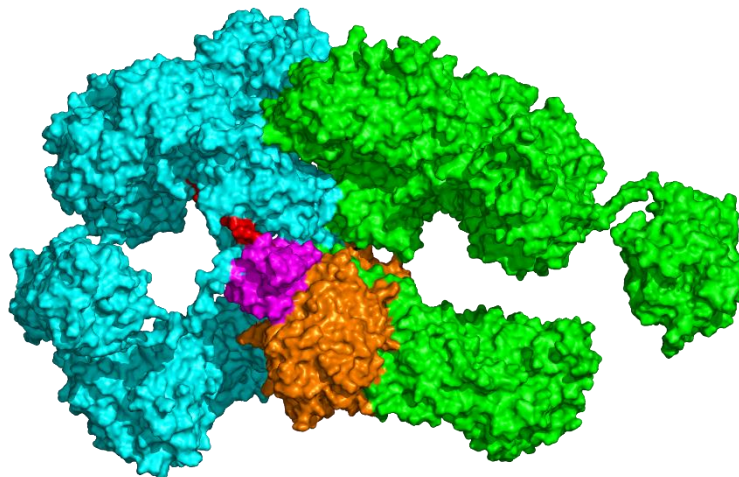


Figure 1: The human fatty acid synthase model consists out of 76 602 atoms, making up two identical chains (green with orange, cyan with red and magenta). The acyl carrier protein (ACP, magenta, 1069 atoms) is docked onto the β -ketoacyl synthase (KS, orange, 13 031 atoms) domain, with the modeled linker (red, 257 atoms) between ACP and rest of the enzyme through the keto reductase (KR) domain.

21675 | Computational Modeling of Electrodes for Lithium-Ion Batteries

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Background & Aim: After their discovery, carbon nanomaterials have been theoretically and empirically studied for a wide gamma of applications. The unique properties seen in these substances solidified them as the most common anode in lithium-ion batteries (LIB) and tailor the future of humanity energetic footprint. This study is a continuation of a published research article [1]. The limelight this time was directed at the graphyne system. **Methods:** Through density functional theory (DFT) calculations, several substituted graphynes were reviewed as potential candidates to be implemented in LIBs. **Results:** The electronic properties of graphyne-1 with seven different substituents in seven different configurations were theoretically estimated to verify their aptitude as electrodes for LIBs. **Conclusions:** The preliminary results show that the nitro substituted graphyne is the most promising one while all other ligands did not appear to enhance the electrode potential with the results available up to this date.

Keywords: Lithium-Ion Battery (LIB), Electrode, Density Functional Theory (DFT), Graphyne, Carbon Nanomaterial.

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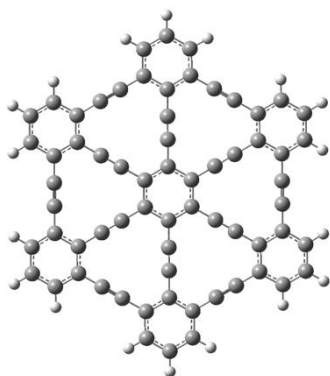


Figure 1: Pristine graphyne structure.

21685 | MOF-808 as effective catalyst to enhance sustainable chemical processes

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Background & Aim: The development of environmentally friendly and efficient catalysts for sustainable chemical processes is essential. The main objectives of this research project were the preparation of metal-organic framework (MOF) materials using sustainable methods and evaluated their performance as heterogeneous catalysts in epoxide ring-opening reactions. [1, 2]. **Methods:** Zr-based MOFs with Zr, MOF-808 and UiO-66-NH₂ were prepared followed the literature [1] and characterized using various techniques like PXRD, IR, FT-Raman, SEM/EDS, TGA, ICP-OES, and GC-MS. Ring opening reactions were quantified using a Scion 8300 GC gas chromatograph. Reaction progress was monitored with periodic GC analysis until product yields stabilized, and the catalyst stability was evaluated after the catalytic reactions using PXRD and FT-IR spectroscopy. **Results:** The MOF synthesis was shifting towards greener methods like water or lower temperatures, as seen in MOF-808. The two Zr-based materials revealed to be effective catalysts in aniline ring-opening reactions, with the MOF-808 outperforming the UiO-66-NH₂, in the system with EtOH (at 70°C of temperature). The two Zr-based MOFs have high selectivity for amino derivatives but not amino alcohols due to Zr metal-epoxide interaction. Furthermore, the MOF-808 showed strong catalytic activity and can be recycled efficiently. **Conclusions:** Current research is focused on developing environmentally friendly chemical processes for large-scale use, which includes the design of active and reusable catalysts like MOFs and the preferential utilization of greener solvents [3]. MOF-808 revealed to be a efficient heterogeneous catalyst for ring-opening reactions between amines and epoxides in MeCN or EtOH, showing high activity and selectivity while maintaining efficiency in multiple recycling and reusing cycles. This study emphasizes the significance of using functional MOFs to improve the sustainability of chemical processes.

Keywords: Metal-Organic Framework, MOF-808, Ring Opening Reactions, Sustainable Processes.

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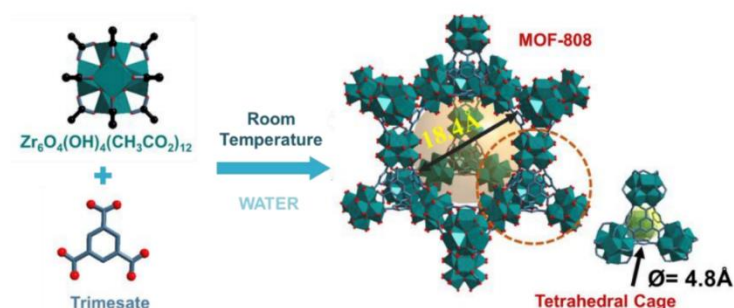


Figure 1: Schematic representation of the sustainable synthesis of MOF-808 (in water and at room temperature in water) showing some features of the crystalline structure of the porous material.

21733 | Thermoresponsive hybrid polymer/tubule hydrogels: promising nanocarriers for drug delivery

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Background & Aim: Ongoing research in nanomedicine and colloidal science led to the development of sophisticated vehicles for the efficient transport of encapsulated therapeutic agents to targeted sites. Polymer hydrogels, due to their high biocompatibility and resemblance to biological tissues, are promising platforms for localized topical treatments [1]. Poloxamer polymers form nanostructured hydrogels through temperature-responsive self-assembly, enhancing their applicability [2]. Moreover, surfactants derived from amino acids can assemble into tubular structures that gel upon specific triggers, providing a safe conveyance of entrapped drugs. [3]. The combination of both components gives rise to novel smart hydrogel systems.

Methods: We investigated the interactions between surfactant tubules and a poloxamer hydrogel matrix. We used novel lysine-derived surfactants 14Lys10 and 10Lys14 to form pH- and temperature-sensitive tubules, which were dispersed in Pluronic F127 hydrogels of differing polymer concentrations (Figure 1). The hybrid hydrogels were characterized by surface tension studies, light microscopy, cryo-SEM, micro-DSC, rheology and cytotoxicity assays. Their release response was evaluated through the entrapment of the fluorescent probe 5(6)-FAM. **Results:** The critical aggregation of the surfactants increases significantly when polymeric micelles are present due to the initial formation of mixed micelles, as shown by surface tension. Addition of F127 also has a drastic effect on the transition temperature of the tubules, as evidenced by DSC and confirmed by rheological data. Both surfactant tubular systems passively entrap the probe, and after polymer addition and gelation, can also release it in a prolonged manner at temperature near skin values. The hybrid hydrogels showed extremely low cytotoxicity in L-929 fibroblasts. **Conclusions:** Overall, results show that these hybrid hydrogels have promising features for a smart delivery of therapeutic agents to topical sites.

Keywords: Poloxamer Hydrogel, Lysine-Derived Surfactants, Smart-Drug Delivery, Stimuli-Responsiveness, Nanomedicine.

Acknowledgments

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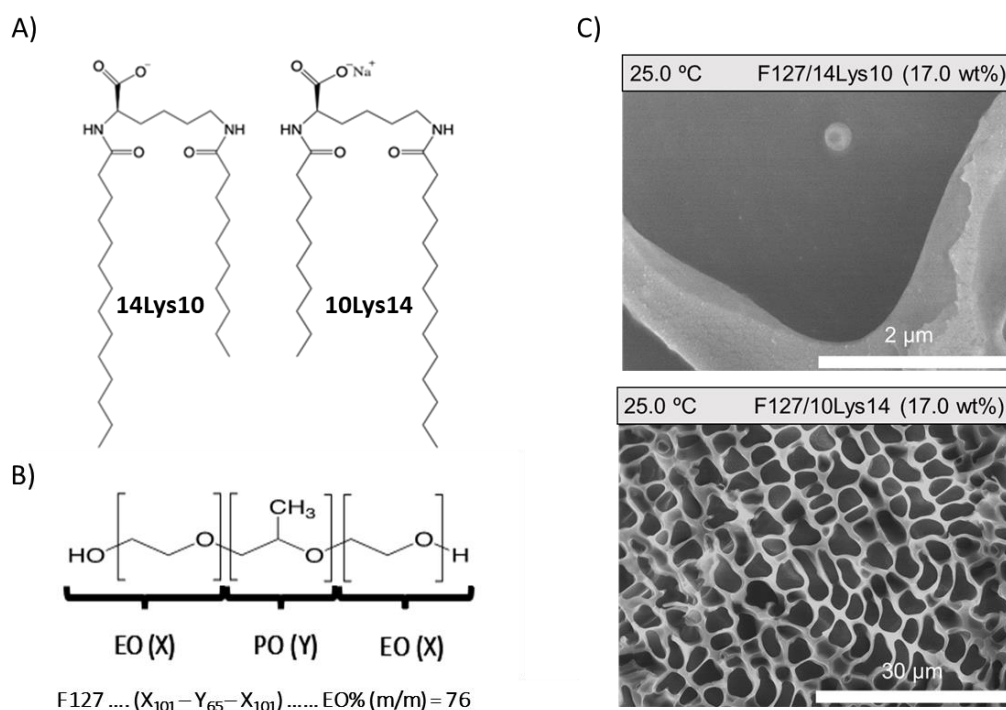


Figure 1: Molecular structure of (A) Lysine-based surfactants and (B) Pluronic F127. Cryo-SEM images of (C) surfactant-polymer mixtures.

21774 | Valorization of biomass by-products in the conception of new materials

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Background & Aim: The agricultural sector is a significant contributor to solid waste and by-products, with rice bran standing out as a particularly notable example. Often discarded in the rice production process, rice bran holds untapped potential for further utilization. Simultaneously, the fossil fuel energy sector faces challenges due to limited petroleum reserves and environmental pollution. This underscores the imperative to explore sustainable alternatives. Biofuels offer a promising solution, but addressing current demand necessitates the development of bio-based additives, such as ethyl levulinate (EL), to reduce consumption of fossil resources and foster value chain sustainability.¹ With these considerations in mind, this study is structured around two key objectives: i) Extracting oil from rice bran for biofuel production; ii) Pyrolyzing degreased rice bran to produce biochar and utilizing it as a catalyst for EL production. **Methods:** Various extraction techniques, including mechanical and soxhlet extraction, were employed to obtain rice bran oil. Subsequently, the pyrolysis of rice bran yielded biochar, which was further functionalized by introducing -SO₃H groups to create acid catalysts for use in EL production. **Results:** Experimental results indicated that soxhlet extraction was the most efficient method for obtaining rice bran oil. Currently, the performance of the prepared catalysts is under investigation, with promising outcomes anticipated in the production of EL. **Conclusions:** This study underscores the potential of rice residues as catalysts and biofuel within biorefinery frameworks. Furthermore, it highlights the significance of industrial by-products in mitigating the pressing need for fossil fuel alternatives. Through leveraging agricultural waste streams like rice bran, this research contributes to advancing sustainable practices and reducing reliance on finite fossil resources.

Keywords: Rice Bran, Biofuel, Ethyl Levulinate, Biochar.

Acknowledgments

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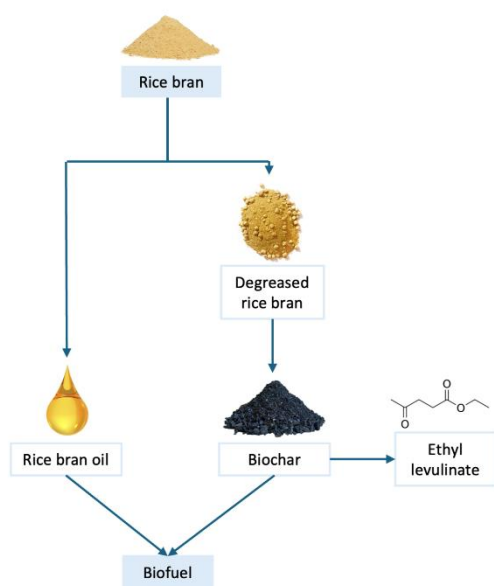


Figure 1: Illustration of rice bran utilization in this work.

21812 | Nanostructured Lipid Carriers for catechol-O-methyltransferase inhibitor controlled release

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Background & Aim: Parkinson disease (PD) is a progressive neurodegenerative disease due to the loss of neurons' function with consequent dopamine depletion, leading to motor impairment [1]. Catechol-O-methyltransferase inhibitors (iCOMT), including entacapone, are one of the most successful therapies to treat PD's advanced stages. However, entacapone presents small oral bioavailability, of around 35%, has a low blood-brain barrier (BBB) permeability and a small half-life [2, 3]. The aim of this work is to encapsulate entacapone in nanostructured lipid carriers (NLCs) to improve its oral bioavailability and half-life, ultimately improving its BBB permeability.

Methods: In this work, we developed a new nanostructured lipidic carrier (NLCs) with controlled drug release features and with improved oral bioavailability. In this work, the optimization of the encapsulation of entacapone was performed using solvent emulsification-evaporation method [4]. A solubility screening was performed to determine the best lipid excipient for the entacapone. The encapsulation efficiency, the controlled drug release kinetics and mucin and pH assays were evaluated using dynamic light scattering (DLS) and UV-vis spectroscopy. Additionally, a stability assay and cytotoxic assays in hepatocarcinoma (HepG2) cells as an *in vitro* model were performed. **Results:** Our findings showed that our NLCs presented a sub-200 nm size throughout our study, with encapsulation efficiencies higher than 90%, and a typical biphasic release profile.

Conclusions: In conclusion, our work showed that NLCs could be an interesting carrier for entacapone, improving its biological properties.

Keywords: Parkinson, COMT Inhibitor, Drug Release, NLCs.

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21856 | Implementation of a dynamic solid-phase extraction procedure to collect volatile organic compounds emitted from wood-based panels

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Background & Aim: Emissions of volatile organic compounds (VOCs) from wood-based panels (WBPs) significantly contribute to the degradation of indoor air quality (IAQ) [1]. WBPs are manufactured by combining wood particles or fibres with a resin, which under the application of heat and pressure in a press, forms a compact panel [2]. This study aims to develop a simpler alternative to existing reference methods (ISO 16000-6:2011 and ISO 16000-9:2011) which require long and complex extraction processes using specific and expensive equipment. **Methods:** In this study, an extraction procedure that relies on the dynamic sorption of volatile analytes into commercially available solid phase extraction (SPE) cartridges using a stream of N₂ is being investigated. The target analytes are volatile carbonyl compounds, that are derivatized with 2,4-dinitrophenylhydrazine (DNPH) and analyzed by HPLC-DAD. **Results:** Initially, the method was evaluated through the extraction of carbonyl compounds standard solutions, with achieving recoveries between 90 and 100 %. Precision tests were conducted to evaluate the performance of the commercial SPE columns, by making consecutive extractions using the same column and different columns, which resulted in relative standard deviations (RSD) lower than 10 %. Columns with different stationary phases (C₁₈ and silica) were evaluated concerning: (i) their ability to be saturated with the DNPH solution, (ii) presence of impurities, and (iii) analyte extraction efficiency. With shredded particleboard samples, the homogeneity of the sample was studied for different sample masses, with RSD values less than 10 % being achieved in all cases. Several experimental factors were also evaluated, such as temperature, the position of the N₂ carrier gas inlet tube or the flow rate. **Conclusions:** The preliminary results demonstrate the potential of the developed method as an efficient and precise alternative for quality control of VOCs emitted from WBPs.

Keywords: Volatile Organic Compounds; Wood-Based Panels; Solid-Phase Extraction.

Acknowledgments

This work received financial support from national funds (FCT/MCTES, Fundação para a Ciência e Tecnologia and Ministério da Ciência, Tecnologia e Ensino Superior) through project PTDC/CTM-PAM/1348/2021 (DOI 10.54499/PTDC/CTM-PAM/1348/2021). This work received support and help from FCT/MCTES (LA/P/0008/2020 DOI 10.54499/LA/P/0008/2020, UIDP/50006/2020 DOI 10.54499/UIDP/50006/2020 and UIDB/50006/2020 DOI 10.54499/UIDB/50006/2020) through national funds. J. R. Santos acknowledges the funding program (DL 57/2016 – Norma transitória, ref. SFRH/BPD/76544/2011) supported by FCT. RMR acknowledges FCT for the Junior Research fellowship CEECIND/04259/2017 through the Individual Call to Scientific Employment Stimulus.

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21864 | Structural and rheological properties of thermosensitive vesicle-loaded hydrogels

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Background & Aim: Treatments for skin cancer include topical chemotherapy but, despite its benefits, the drawbacks include low skin permeability and cytotoxicity [1]. Poloxamers are tri-block copolymers that possess thermo-induced gelation properties and can be used for tissue regeneration and topical drug delivery [2]. Catanionic systems, composed of oppositely charged surfactants, can spontaneously form robust vesicles with tunable physicochemical properties (size, charge and stimuli-sensitivity) [3]. The goal of this work is to develop biocompatible hydrogels based on commercially available poloxamers (F127 and P123), as a scaffold for thermo-sensitive catanionic vesicles. The catanionic vesicles are based on the anionic surfactant SDDS (sodium-N-dodecanoyl sarcosinate), and the cationic gemini surfactant 12-2-12, loaded with an anti-cancer drug for the treatment of melanoma. **Methods:** SDDS:12-2-12 vesicles were dispersed in both F127 and P123. The hydrogels *per se* and drug-loaded hydrogels were characterized regarding microstructure and physical properties by DLS, light microscopy, surface tension, micro-DSC, and rheology (Figure 1). Upon thermal stimuli, the system's encapsulation capacity and its release profile were evaluated. **Results:** The critical aggregation concentration (*cac*) of the catanionic vesicles changes significantly when in presence of the hydrogel, increasing when the concentration of polymer is increased. This is a result of the initial formation of mixed micelles which also affects the transition temperature of the hydrogels and give rise to an additional phase transition observed by micro-DSC. Results on the non-Newtonian flow behaviour of the hybrid hydrogels will also be presented. **Conclusions:** Catanionic SDDS:12-2-12 vesicles can be added to thermosensitive hydrogels based on F127 and P123, which function as scaffolds for the vesicles inducing hybrid hydrogels with interesting structural and rheological properties, and great potential for drug delivery applications.

Keywords: Hydrogel; Catanionic Vesicles; Drug Delivery; Stimuli-Responsive Systems.

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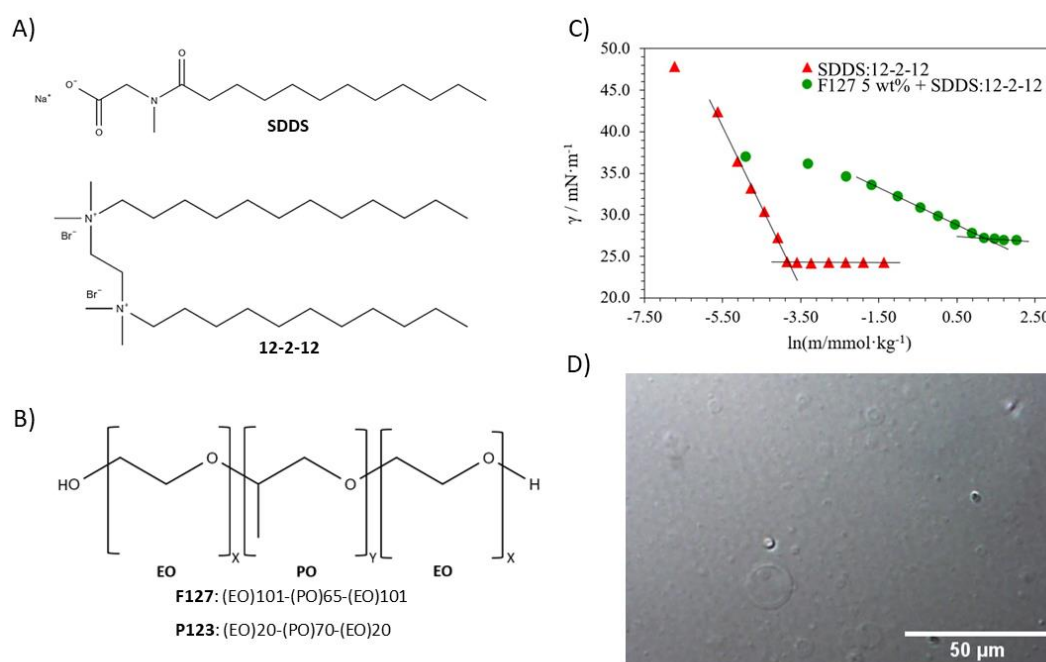


Figure 1. (A) Molecular structures of sodium lauroyl sarcosinate surfactant (SDDS) and 12-2-12 gemini surfactant. (B) Molecular structures of pluronic F127 and P123. (C) Surface tension vs. \ln (concentration) plot for the cationic system SDDS:12-2-12 ($x_{12-2-12} = 0.40$) and for the mixture F127 (5wt%) / SDDS:12-2-12 ($x_{12-2-12} = 0.40$). (D) Light micrograph of the mixture F127 (5 wt%) / SDDS:12-2-12 ($x_{12-2-12} = 0.40$, 10 mM).

21916 | Synthesis of new chalcone-kojic acid hybrids with potential skin-lightening effects

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Background & Aim: Kojic acid, a traditional skin-lightening agent with antityrosinase activity has been widely used in cosmetic formulations. However, it presents some limitations such as low stability, and adverse effects such as increased susceptibility to sunburn and concerns regarding potential carcinogenicity and endocrine disruption.¹ Chalcones are a class of natural products also displaying beneficial effects on the skin, acting as antioxidant, anti-inflammatory, photoprotective, depigmenting, immunomodulatory, and anti-aging agents.^{2,3} This study aimed to synthesized potent depigmenting agents as alternative ingredients to kojic acid, showing also other beneficial effects to the skin, acting as multifunctional ingredients for skin care. **Methods:** Propargylated chalcone intermediates were synthesized via Claisen-Schmidt condensation at room temperature or by conventional heating. Click Chemistry reactions between these intermediates and kojic acid azide resulted in the desired hybrids. All compounds were characterized by infrared and nuclear magnetic resonance spectroscopy. **Results:** Six propargylated chalcone intermediates, two kojic acid derivatives, and four chalcone-kojic acid hybrids were successfully synthesized and characterized. The synthesis of propargylated chalcone intermediates by conventional heating afforded the desired compounds with improved yields. Click Chemistry reactions yielded hybrids with low to moderate yields (7.7% - 34.3%). Further optimization exploration, including catalysts and solvents, is suggested for enhanced yields in future studies. **Conclusions:** This study achieved the synthesis of novel chalcone-kojic acid hybrids with potential as tyrosinase inhibitors for skin-lightening. Further research is recommended to expand compound libraries for structure-activity relationship studies. Biological assays should assess antityrosinase activity compared to kojic acid and explore multifunctional properties. Priorities include stability, safety, and eco(toxicity) evaluations for synthesized compounds. This research contributes to developing safer and more effective skin-lightening ingredients, addressing kojic acid limitations.

Keywords: Kojic Acid, Chalcones, Antityrosinase, Click Chemistry, Depigmenting Agents.

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COMMUNICATION AND POLITICAL SCIENCES



21753 | Environmental Journalism: A case study of Público's "Azul"

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Background & Aim: The increasing global environmental concerns calls for a more focused approach in journalism, to engage and educate the public. This study aims to analyze the impact of Público's "Azul" project on the environmental journalism in Portugal and the reasons for its creation. **Methods:** Employing content analysis, this research evaluates the volume of environmental journalism in Público before and after the launch of "Azul". The study also incorporates an interview to access the reasons behind the creation of the project and the thematic evolution. **Results:** Findings suggest a significant increase in environmental coverage post-"Azul", with a notable enhancement in thematic diversity and depth. The journalist interviewed highlighted the creation of a specialized team for "Azul" as one of the main reasons for the thematic evolution. **Conclusions:** The "Azul" project significantly contributes to the advancement of environmental journalism, fostering greater understanding of environmental concerns. Its creation and success underscores the critical role of specialized journalism in addressing global challenges and shaping public discourse.

Keywords: Environmental Journalism, Media Analysis, Público.

Acknowledgments

The author thanks Dr. Fernando Zamith for the orientation during the investigation.

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21650 | Co-creation of Science Communication Routes: the GreenUPorto case study

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Background & Aim: Science communication should be a priority for research units since it bridges science, the stakeholders and the public. However, recent studies revealed that there is still progress to be made. One of the main struggles in institutional science communication is the engagement of researchers without communication training. Also, science communicators seldom integrate research teams, which furthers the need to find a solution. The present work aimed to assess the implementation of co-creation workshops to increase the literacy of researchers regarding science communication and actively involve them in the creation of a science communication strategy. **Methods:** The first step was to conceptualize and implement workshops with different research teams that integrate GreenUPorto research center. The workshops were designed and facilitated by science communicators and aimed to familiarize the researchers with topics relevant to science communication. Later on, participants were challenged to apply these concepts to the creation of a story about their research group's scientific endeavors. Word clouds were created to analyze the insights of scientists during these events. **Results:** In total, 2 events were delivered. The 1st event gathered 37 present participants, with most of them being PhD students (37%). During this event, 6 stories were produced. The 2nd event counted with the presence of 26 participants, the majority of whom were PhD students (31%) and researchers (31%). The 2nd workshop was an opportunity for researchers to get feedback from their peers about their stories, allowing for improvements. During this workshop, one new story was created, and all attendees voted on their favorite stories. **Conclusions:** Through co-creation, researchers seemed more open to communicate their research using creative approaches. The most voted story will be implemented as a thematic route throughout the campus of the institution and guided visits will be provided for GreenUPorto's visitors.

Keywords: Science Communication, Storytelling, Training, Workshops.

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21767 | EU-nique perspectives? Analyzing Contrasting Positions on the Russo-Ukrainian Conflict within the EU

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This research examines the varied positions adopted by the European Union (EU) Member States in response to the ongoing Russo-Ukrainian conflict. It unravels the divergences that exist within the EU as a collective body, since the reignition of the conflict on February 24th, 2022. The study is based on a content discourse analysis of speeches and official statements released by individual EU Member States, namely Hungary, due to its Prime Ministers' public statements; followed by Germany and its pivotal role in providing military hardware for Ukraine; and lastly, Poland, owing to its historical relations with the Eastern Bloc and the importance it has in helping/accommodating refugees. The primary aim is to unveil whether there is consensus within the organization, specifically between the European Commission, representing the best interests of the EU, and these Member States or, on the other hand, whether diverging positions within the Union ail its support for Ukraine. Therefore, through a juxtaposition of these countries' opinions against the overall EU stance, we conclude that the organizations' support for Ukraine is not as robust and cohesive as commonly believed.

Keywords: European Union, Russo-Ukrainian Conflict, Member States, European Commission, Consensus.

21879 | "Dialogues between Gender and Art: Decoding "Gineceu Androceu" through the Semiotics of Visual Communication

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Background & Aim: In contemporary times, gender performativity and identity have been central themes in social and cultural discussions. The exhibition "Gineceu Androceu" by artist João Telmo, proposes an artistic reflection on these issues, inspired by the reproductive system of flowers, characterized by the simultaneous presence of female and male reproductive organs. This project challenges traditional gender norms, using art as a language to dialogue about the fluidity and complexity of gender identity. The present study aims to analyze the images of the exhibition from the perspective of semiotics of communication, with the goal of exploring how gender performativity and identity are represented and questioned through photography, notably resorting to fashion, performance, and characterization. Thus, we intend to unveil the layers of implicit meaning in João Telmo's work, analyzing how the interaction between visual and performative elements contributes to a deeper understanding of gender expression as a diverse and multifaceted spectrum. This study not only aims to study the aesthetics of "Gineceu Androceu", but also to contribute to a broader reflection on gender, art, and society, offering new perspectives on how art can influence and reflect contemporary gender dynamics.

Methods: For this purpose, we adopted a methodology of semiotic analysis focused on the decomposition of visual signs and the interpretation of connotative and denotative meanings present in the photographs. The analysis was structured in several stages, starting with the contextualization of the project, where we investigated the historical, cultural, and social context in which the exhibition "Gineceu Androceu" was conceived, including João Telmo's intentions in addressing gender conventions through art. This was followed by the denotative description of visual elements, where each photograph was analyzed to identify objects, characters, gestures, and space, providing an objective basis for subsequent analysis. In the stage of semiotic deconstruction, we explored the signs related to gender and identity, evaluating how the choice of clothing, poses, and facial expressions work together to question traditional gender norms. In parallel, we analyzed the intertextuality present in the works, identifying references to other cultural, artistic, or historical texts, and how these relationships enrich the interpretation of the images. The last phase of the method involved a deep reflection on the relationships between

the various artistic disciplines involved, such as photography, the act of representation carried out by the portuguese actors who participated in the work, fashion, and performance, considering how the synergy between these forms of expression amplifies the discourse on identity and gender. This process allowed for a holistic understanding of the layers of meaning that João Telmo intends to communicate through his work. **Results:** The results demonstrate that the images of “Gineceu Androceu” employ a complex network of visual signs to subvert traditional gender norms. The exuberant characterization and innovative use of clothing create an ambiguity that challenges the binary categories of masculine and feminine. On top of that, the choice of black and white intensifies the contrast and expressiveness of the explored themes, facilitating a multifaceted interpretation of gender fluidity. **Conclusions:** The exhibition “Gineceu Androceu” emerges as a powerful mean of visual communication that questions and expands the boundaries of gender performativity and identity. It manages to make the photographs surpass the limit imposed on them by the frame used in the exhibition as an itinerant showcase. Through a semiotic approach, it was possible to understand how art can function as a vehicle for discussion and reflection on contemporary social and cultural issues. We conclude that João Telmo's work significantly contributes to the dialogue about gender, offering new perspectives on the expression of identity in today's society.

Keywords: Gender Performativity; Semiotic Analysis; Identity, Artistic Expression.

Acknowledgments

We thank the author of the exhibition and Nova Companhia for their contribution and availability shown in carrying out this study. In memory of Amâncio Martins who introduced the exposition.

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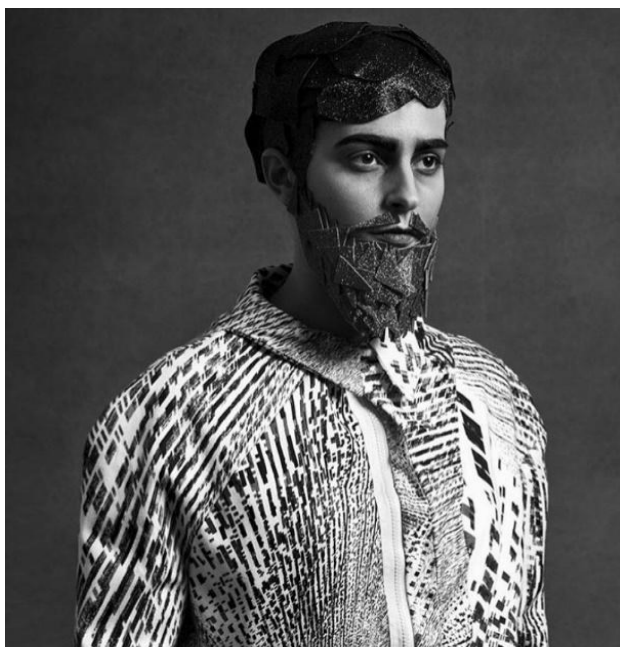


Figure 1: Actress Benedita Pereira dressed by Awaytomars



Figure 2: Actress Carla Bolito dressed by Nair Xavier



Figure 3: Actress Soraia Chaves dressed by Luís Carvalho e Ceage



Figure 4: Actress Vera Kolodzig dressed by Story Tailors Atelier



Figure 5: Actor Diogo Amaral dressed by Miguel Vieira



Figure 6: Actor Paulo Pires dressed by Story Tailors

21890 | Overcoming a drought of solutions: Strategic Diplomacy's value for the Grand Ethiopian Renaissance Dam negotiations

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Background & Aim: The impact of anthropogenic activity on fundamental planetary dynamics has pushed us into a new geological epoch, where the biophysical and human spheres become indistinguishable. Such a seismic paradigm shift has turned the Anthropocene into a pressing matter for International Relations, sparking much research and debate in recent years. Transboundary fluvial systems are crucial for this discussion given that rivers are socio-ecological systems, particularly due to far-reaching hydraulic infrastructure such as the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile. This project has fueled lengthy negotiations between Ethiopia, Egypt, and Sudan, posing a threat to regional peace and security. The conundrum has merited African Union mediation and the first ever United Nations Security Council meeting on dam construction. **Methods:** Against said backdrop, this article contributes to existing literature by linking the theoretical stance on the Anthropocene with the newly created Strategic Diplomacy (SD) framework. Through this original conceptual matrix, we analyze the complex dynamics surrounding the GERD. **Results:** This research indicates that present challenges derive from an excessive *Raison d'État* inclination and a lack of strategic thinking by decision-makers, namely a big-picture vision of impacts on the biosphere. The SD framework appropriately addresses the problem, since it emphasizes *Raison de Système*, while focusing on long-term strategizing, avoiding ecological tipping-points, and prioritizing reflexive reevaluation practices. **Conclusions:** As competition for Blue Nile's water resources shows, those crafting diplomacy should seek new ways to govern shared systems. Therefore, this article proposes a valuable new framework to academics researching the political challenges of the Anthropocene. It also advances holistic and adaptive policy recommendations for those striving to create system-wide responsibility in an unpredictable, interconnected world.

Keywords: Anthropocene; Strategic Diplomacy; Great Ethiopian Renaissance Dam; Water Diplomacy

Acknowledgments

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21985 | Migration through the lens of Feminist International Relations Theory: An Ethnographic Study

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The positivist approach of International Relations (IR) theorists to the international migration phenomenon has hitherto been state-centric, with some considering the role of international organizations. Nevertheless, feminist theorists have introduced a new outlook on migration, focusing on the importance of gender and the individual experience of the migrant. The focal point of ethnography itself is the individual level of analysis. This ethnographic study aims to analyze the experience of a refugee through the lens of the feminist theory of IR, thereby raising awareness and illuminating the challenges faced by a migrant with an internationally recognized status. Within this framework, in this study I ask whether and how the migration experience of refugees is influenced by gender. In doing so, the research contributes to our understanding of how gender matters in global mobility and how migration policies affect the individual. To achieve these aims, a literature review on migration studies, refugees and feminism is conducted alongside a semi-structured interview with a refugee. The critical framework of the feminist theory is then applied to the case studied, therefore allowing for several conclusions to be made. This work includes an introduction, a literature review, the methodology applied (participant, measures and data analysis), results, a discussion and a conclusion (including limitations of this study and suggestions for future studies).

Keywords: Migration, Refugee, Feminism, International Relations.

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22053 | Resonance of Populism: Shaping Israel's Leadership Narratives on the Palestinian Conflict

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This paper aims to examine the complex relationship between populism, nationalism, and the construction of national identity in the context of the Israel-Palestine conflict. Based on a post-structuralist and constructivist perspective and through discourse analysis, it analyzes the populist rhetorical strategies employed by Israeli political figures, highlighting the fundamental role of leaders such as Benjamin Netanyahu in the evolution of Israel's foreign policy concerning Palestine. Since 1995 Netanyahu's rise to power and his right-wing political approach have marked a change in the national ethos, permeating foreign policies and shaping Israel's stance on the international stage regarding the conflict. On the international scene, it is necessary to identify the elements and the basic tools used by political figures in their discourse and their repercussions in the area of politics. It concludes that the intricate connection between populist rhetoric, national identity, and political measures has influenced Israelis' domestic perceptions of Palestinians, fueling a sense of legitimacy (among Israeli people) that directly impacts the prospects for peace in the region.

Keywords: Israel, Populism, Foreign Policy, Palestine.



CRIMINOLOGY AND LAW

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21356 | Parenting styles and children and youth's externalizing and internalizing behaviours: the indirect effect of self-control

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Background & Aim: In recent decades, children and youth's externalizing and internalizing behaviours have been the object of extensive criminological research, mainly due to the harmful impact they might have on their development and later social, emotional, and behavioural adjustment and functioning. Previous studies have revealed that parenting styles are associated with the development of such behaviours and that, self-control might also play an important role in explaining their emergence (Rinaldi & Howe, 2012; Rose et al., 2018; Tehrani & Yamini, 2020). Thus, the main goal of the current study was to explore the influence of parenting styles (authoritarian, authoritative, and permissive), on the emergence of these behaviours and to understand if and how self-control influences this relationship. **Methods:** To do so, the current study followed a quantitative and cross-sectional approach, using a Portuguese sample of 472 middle-school children and youth. Data were gathered through a self-report questionnaire for the participating children and youth. **Results:** The results revealed that children's sex and age, authoritative and permissive parenting styles, and low self-control significantly predicted externalizing behaviours. In turn, children's sex, authoritarian and authoritative parenting styles, and low self-control predicted internalizing behaviours. Low self-control partially mediated the relationship between parenting styles and externalizing and internalizing behaviours in five of the six models tested, the only exception being the model testing low self-control as a mediator of the relationship between permissive parenting style and internalizing behaviours. **Conclusions:** This study extends previous research by exploring the influence of family and individual factors in the development of children's and youth's externalizing and internalizing behaviours. Furthermore, it provides useful data for developing prevention and intervention strategies for parents, children, and youth.

Keywords: Externalizing Behaviours, Internalizing Behaviours, Parenting Styles, Self-Control, Indirect Effects.

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21403 | Navigating social reintegration after prison: Understanding the perspectives and experiences of sexual offenders on parole

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Background & Aim: After serving a prison sentence, former inmates embark on a significant adaptation process, commonly known as community reintegration, where they usually face several barriers that might negatively affect their success. Previous studies have demonstrated that these difficulties are even greater when it comes to sexual offenders [1] [2]. Thus, this study seeks to analyze the experiences and perceptions of individuals on parole for sexual offenses, exploring the hurdles faced during their reintegration process. **Methods:** To do so, the current study followed a qualitative approach, using semi-structured interviews to explore the perceptions of former inmates convicted of sexual offenses ($n = 10$) on topics such as housing, employment, interpersonal relationships, institutional support, and perceived stigma upon their release. **Results:** Most participants described a complex reintegration process, primarily influenced by financial struggles, unemployment, the nature of the offense, the related stigma, and the insufficient prison support that intensified these challenges. Conversely, most interviewees reported having a good experience with the parole services, which helped them with different matters, such as recidivism prevention, skills development, and increased awareness of victim needs. Also, most participants did not face difficulties regarding housing or social and affective relations. **Conclusions:** This study enhances prior research by exploring the experiences of sex offenders during their community reintegration process. It offers valuable insights to inform the creation of more effective public protection policies and practices while guiding justice systems and prisons in implementing crucial strategies for enhancing successful re-entry and reintegration.

Keywords: Sex Offenders, Community Reintegration, Reintegration Barriers, Parole.

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21404 | “*Bicha de um lado, homem do outro*”: Experiences of imprisonment by the Brazilian LGBT community

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Background & Aim: The LGBT prison community has been the subject of increasing attention in academic studies, mainly regarding housing, victimization, and health care [1] [2]. Although there is growing visibility in this field of research, evidence about the experiences of imprisonment by the LGBT prison community is still limited to North American and primarily focus on transgender women [3]. To fill this gap, the current research aimed to describe the experiences of imprisonment by the LGBT prison community in a Brazilian male prison.

Methods: Data were collected by semi-structured interviews with a purposive sample of 10 inmates from the Provisional Detention Center II in the state of São Paulo. Among the participants, 6 individuals identified as transfeminine, 3 as male homosexuals, and 1 with a fluid identity. **Results:** The analysis generated three themes: challenges in adapting to prison, housing, and victimization. The challenges in adapting to prison involved emotional aspects, interpersonal relationships, ways to obtain material resources, and access to services and care. Housing refers to the use of and perceptions about assigned cells, hierarchy dynamics, organization of tasks within cells, and perceptions of (in)security. Regarding victimization, participants identified the types and consequences of crimes they suffered at the prison, as well as factors that protected them from victimization. **Conclusions:** Results corroborate the deprivation model and the “pains of imprisonment” [4], such as deprivation of resources, services, and family. However, the experiences of imprisonment described by LGBT inmates may be further affected by specific situations, such as deprivation of hormone treatment, inadequate living spaces, and discrimination. The study found that providing assigned cells for the LGBT community is no guarantee that prison staff is trained to prevent discrimination and violence, nor does it guarantee peaceful coexistence between LGBT prisoners solely because of their shared gender identity and/or sexual orientation.

Keywords: LGBT, Imprisonment, Adaptation, Housing, Victimization.

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21427 | Cyberbullying and Cybervictimization: Relationship with parenting styles, empathy and sex

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Background & Aim: The increasing and frequent use of the internet and digital resources has changed the patterns of perpetration and victimization of antisocial behaviour, creating opportunities and additional means for these phenomena to occur in the cyber space [1]. Therefore, despite the benefits, using new technologies also brings risky interactions that can impact an individual's safety and emotional well-being [2], including the occurrence of cyberbullying (CB). These harmful behaviours are perpetrated through electronic/digital means and encompass messages to cause distress/harm to others [3]. Despite its consequences, research concerning the risk/protective of CB and cyber victimization (CV), including individual, interpersonal and community factor is still scarce [4]. This study analyzed the link between CB/CV and parenting styles, exploring the mediational effect of empathy and the moderate effect of sex in this relationship. **Methods:** A self-report questionnaire was administered to 345 students (ages 12-17) in two schools. CB perpetration and CV were measured using the CBQ and CBQ-V scales, respectively. Empathy was assessed with the BES-A scale, and parenting styles were measured using the short version of the PSDQ. **Results:** Authoritarian parenting style by fathers was associated with higher levels of CB, whereas a democratic style by fathers and high levels of cognitive empathy were linked to less CB. No predictors of victimization were identified. Empathy did not mediate the proposed relationship. Male sex moderated the influence of authoritarian style by fathers on CB. **Conclusions:** The results showed the relevance of parenting styles on CB. The lack of significant predictors for CV calls for more research about the dynamics/risk factors that lead to victimization. Also, male youth may be more affected by authoritarian fathers, suggesting the need for gender-sensitive approaches in addressing CB.

Keywords: Cyberbullying, Cybervictimization, Democratic Style, Authoritarian Style, Empathy.

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21503 | *"It was horrible, it was traumatic"* – Secondary victimisation of migrant women under Narrative Victimology approach

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Primary contact with the justice system can determine victims' access to the effective exercise of their rights, as well as generating damaging institutional reactions towards victims. The aim of this paper is to expose the phenomenon of secondary victimisation resulting from the interaction between migrant women who have suffered a crime and Portuguese criminal police agencies. Concepts such as victimity and secondary victimisation will be presented, based on classic theories such as "The Ideal Victim" (Christie, 2018) and "Belief of a Just World" (Lerner, 1980), and current theorisations such as Fricker's notion of epistemic injustice connected to secondary victimisation (Pemberton & Mulder, 2023). The impact of migrant status is also observed, in intersection with gender, race and nationality for the occurrence of a "second injury" (Symonds, 2010). Narrative Victimology was adopted as a methodological and data analytical approach, providing greater subjective range into the impacts of secondary victimisation on victims and the role of narrative to the identity reconstruction (Pemberton et al., 2017). Data was collected in 2023 in semi-structured interviews with nine participants in the study. Using a narrative analysis framework composed of three dimensions - identity, emotions and culture (Pemberton & Aarten, 2018), and under an intersectional lens, experiences of victimisation in police contact will be analysed. It was found that seven of the nine participants suffered secondary victimisation, that emotional impacts were prevalent, that police officers reproduced gender stereotypes about Brazilian women during their assistances and those victimisations were more painful for some due to intersection of their gender, migrant status and nationality. This study highlights Narrative Victimology as an innovative methodology, how secondary victimisation can manifest itself for a particularly vulnerable group and the reflexivity - considering the first author is a woman who is also a migrant.

Keywords: Migrant Women, Secondary Victimisation, Narrative Victimology, Interseccionality.

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21544 | The influence of education and work experience in the area of justice and security on public perceptions of crime seriousness

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Background & Aim: Prior research indicates that the substantial heterogeneity in public perceptions of crime seriousness is not significantly related to sociodemographic variables and victimisation experiences (Stylianou, 2003). This study seeks to investigate the potential influence of educational and occupational backgrounds on public perceptions of crime seriousness, building upon findings from previous studies (e.g., Levi & Jones, 1985; McCleary et al., 1981; Pontell et al., 1985). **Methods:** An online survey was administered to a sample of 408 adults residing in Portugal in March of 2022, recruited from the academic community of the University of Porto and the general population. Crime seriousness perceptions were measured using offence scenarios of situations of conventional and white-collar crime, each of them with two levels of apparent crime seriousness (heavier scenario vs. lighter scenario). All participants evaluated a total of 20 scenarios, but this study specifically concentrates on the heavier scenarios. **Results:** Findings revealed no significant differences in perceptions of crime seriousness between participants with backgrounds in justice and security and those from other fields of education or work. Nonetheless, the former consistently assigned lower mean scores to the seriousness of the presented scenarios. Conversely, the latter tended to attribute higher mean scores, particularly in scenarios involving white-collar crime. **Conclusions:** This study posits that variations in public perceptions of crime seriousness are not significantly related to differences in education and/or work background. Nevertheless, it is noteworthy that individuals associated with justice and security exhibited reduced perceptions of seriousness, particularly evident in scenarios involving white-collar crime. Future studies should seek to uncover the underlying mechanisms contributing to the apparent desensitization of these individuals towards crime seriousness.

Keywords: Public Perceptions, Crime Seriousness, Education, Work Experience.

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21551 | From Hacktivism to Cyberterrorism: The “Killnet” Group and the Protection of Cyberspace in Portugal

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Background & Aim: Currently, cyberspace offers the potential for numerous actions, including hybrid conflicts. These are attacks towards physical and virtual targets and have been used particularly in the Russia-Ukraine conflict [1]. This context has allowed the proliferation of cybercriminal groups with diverse motivations and objectives, which makes it difficult to define their criminal nature. Benefiting from social instability, hacktivism and cyberterrorism are currently considered threats to the security of countries [2], and require protective measures to be taken by States and other actors. This investigation will characterize “Killnet”, one of the most active pro-Russian hacker groups that have been targeting Western countries since 2022 [3]. It will also identify potential mechanisms used in Portugal for protecting the cyberspace and confronting “Killnet” attacks against Portuguese targets. **Methods:** The data comes from semi-structured qualitative interviews carried out in early 2024, with professionals and experts in the areas of Cybersecurity and Terrorism working in Portugal, including, for example, cybersecurity companies. Moreover, 15 online news about the group, published between 2022 and 2024 in two Portuguese news media, were also analyzed. **Results:** With the investigation ongoing, preliminary results reveal that “Killnet” is a cyberterrorist group due to its motivations and objectives. The data also points to the adoption of protection strategies against cyber threats in Portugal based on prevention, detection and reaction, as well as the creation of intersectoral and international collaborations to improve cybersecurity. **Conclusions:** Results from this study will contribute to new criminological knowledge about topics which have not been fully addressed so far by the literature. Moreover, this study helps to assess the mechanisms that may favor the increase of cybersecurity capabilities and reduce the likelihood of new cyberattacks, particularly to Portuguese targets.

Keywords: Cybersecurity, Cyberterrorism, Hacktivism, Killnet, Portugal.

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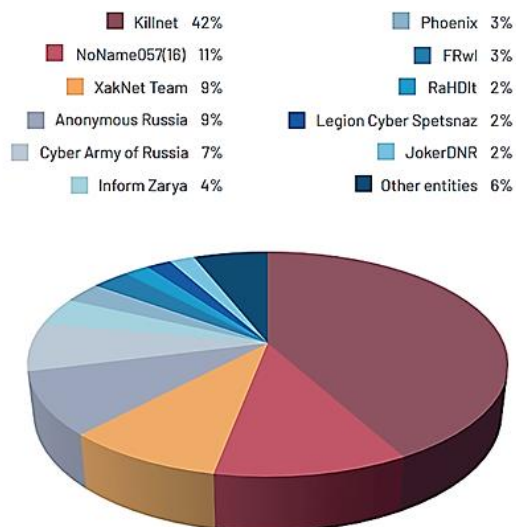


Figure 1: Pro-Russian Supposed Hacktivist Groups and % of Attacks (Computer Emergency Response Team for the European Union institutions, bodies, and agencies [CERT-EU], 2023).

21883 | Perceptions of procedural justice in shaping legal attitudes and behaviour: a legal socialization approach to the study of juvenile delinquency

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Background & Aim: Procedural (in)justice of legal and non-legal authorities when dealing with children and adolescents throughout their life-course is pointed as a central aspect in the development of young people's legal socialization process, through which they acquire and shape personal attitudes about the law and its enforcers, such as police and courts. These legal attitudes, in turn, have been revealed to shape their (non)compliant behaviour with the law. Thus, the fairness of procedures during interactions with youth should be a primary concern for a variety of authorities in different institutional contexts, given its influence on young people's present, as well as future, law-abiding behaviour. Although studies on the legal socialization of young people have been conducted in different countries, to the best of our knowledge, in Portugal are non-existent. Therefore, the present research aims to analyze whether perceived procedurally (un)fair interactions with three figures of authority (parents, teachers, and police) influence young people's levels of legal cynicism and perceived police legitimacy, and whether these two variables explain self-reported delinquency. **Methods:** Adopting a quantitative methodology, data is collected through a self-reported questionnaire administered to a sample of high-school students. **Results:** Preliminary findings suggest that adolescents who perceive their parents, teachers and the police as more procedurally just report higher levels of perceived police legitimacy. Additionally, youth who perceive their teachers as procedurally unjust and the police as less legitimate report higher levels of delinquency. **Conclusions:** These findings point to the importance of just procedures by legal and non-legal authorities in their interactions with young people in shaping youths' attitudes about the law and its enforcers, as well as in their behaviour. These and other findings will be presented and discussed and their relevance to juvenile delinquency prevention will be highlighted.

Keywords: Legal Socialization, Procedural Justice, Police Legitimacy, Legal Cynicism, Juvenile Delinquency.

21893 | Causation in civil liability of healthcare professionals: the systemic issues

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Background & Aim: This research examines the challenges of establishing a causal link in the civil liability of healthcare professionals within the Portuguese legal framework. It aims to explore how those very same challenges affect the attribution of civil liability to healthcare professionals and what is the role of the major systemic issues. **Methods:** This study employs a qualitative research approach, utilizing legal analysis and review of relevant jurisprudence to examine causation in healthcare professionals' liability cases within the Portuguese legal framework. Key legal doctrines, court decisions, and scholarly literature are reviewed to understand the factors influencing the establishment of causation and the allocation of civil liability in cases involving healthcare professionals. **Results:** The analysis reveals a notable imbalance between the injured party and the injurious party in the studied cases, with the burden of proof disproportionately affecting the first one. Recent jurisprudential trends indicate a shifting approach, with courts occasionally resorting to burden-shifting mechanisms to address imbalances. Instances where undeniable harm occurs, yet healthcare professionals successfully refute evidence of negligence, are proof of the complexity of establishing causation and thus allocating liability. **Conclusions:** The conclusions drawn highlight systemic issues, such as poor governance and lack of resources, as well as factors like burnt-out health professionals, which mine the services' ability to perform optimally. Consequently, the Government bears responsibility for its failure to intervene adequately, preventing services from becoming overwhelmed and ensuring healthcare professionals' labour rights, including, but not limited to, adequate rest and adequate pay. This study underscores the need for a nuanced approach to establishing causation and allocating civil liability in malpractice cases, considering the broader systemic context and the rights and responsibilities of all parties involved.

Keywords: Law, Healthcare, Governance.



ECONOMICS AND MANAGEMENT

JUP
17.^a EDIÇÃO

21374 | Heterogeneity in Real Wage Cyclicity: Evidence for the Portuguese Labour Market

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Background & Aim: This work revisits the study of Carneiro et al. (2012) which measured the real wage cyclicity in the Portuguese labour market, with the aim of extending the period of analysis to include the 2008-2021 years, composing a sample with three complete business cycles and 62,127,466 observations. Additionally, this study further explores real wage cyclicity by taking into account individuals' sociodemographic characteristics and firm characteristics. Finally, this study evaluates to what extent wage cyclicity varies according to the phase of the business cycle. **Methods:** To evaluate the cyclical behaviour of real average total hourly earnings, a level wage equation that simultaneously controls for firm, worker and job title heterogeneity with three high-dimensional fixed effects is estimated. This methodology is applied to administrative linked employer-employee data that allows for the control of compositional effects as well as specification bias. **Results:** This study presents six main novel findings. First, it reveals that the most extreme phases of the business cycle are the ones that lead to the highest wage cyclicity. Second, it indicates that more education tends to lead to less wage cyclicity and less cyclical job upgrading/downgrading. Third, it shows that wage cyclicity tends to increase with a worker's age. Fourth, it demonstrates that larger firms seem to adjust more hiring wages than the wages of more-tenured workers. Fifth, it reveals that workers of the two autonomous regions of "Açores" and "Madeira" experience less real wage procyclicality than workers of Mainland Portugal. And, finally, it provides evidence that wage cyclicity is much more correlated with labour market conditions than with other aggregate economic indicators. **Conclusions:** All of these findings seem to indicate that the solution for the development of macroeconomic models with adherence to reality seems to be to include heterogeneity in wage cyclicity.

Keywords: Real Wage Cyclicity, Heterogeneity, Fixed Effects.

Acknowledgments

First, I have to thank Statistics Portugal (INE) for providing me with the data without which this study would not be possible. The second word goes to my supervisor, Professor Anabela Carneiro, without whom I would not be able to successfully finish such a challenge as completing

this work. Words cannot express how invaluable her contributions to this project were, through her enriching suggestions and tireless and timely feedback.

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21818 | “An opportunity or a disaster? Unpacking Brexit’s Influence on FDI Flows in and out of Asia”

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Background & Aim: Brexit, the exit of the United Kingdom (UK) from the European Union (EU) in 2020, has caused a rise in Euroscepticism, shaping the economic relations in the EU and worldwide. This article analyses the impacts of Brexit on the UK’s foreign direct investment (FDI) inflows and outflows. Previous studies have focused on the consequences of Brexit on FDI in the UK and the EU. However, we propose an alternative investigation of the effects of this event in 9 Asian countries: China, Hong Kong, India, Indonesia, Japan, Malaysia, Singapore, South Korea, and Thailand. The relevance of this approach is related to the economic power concentrated in these countries, such as China and India, which have been registering significant growth in the last decades and influencing the global dynamics of FDI outflows and inflows. We start by giving an overview of the international repercussions of Brexit. Afterward, we focus our research on the Asian continent. **Methods:** In order to investigate this topic, we use previous literature and quantitative methods based on the databases of the World Bank and the UK’s Office for National Statistics. We apply the Regression Analysis and Ordinary Least Squares on data from 2009 to 2022, (126 observations), to compare FDI before and after Brexit. Our research focuses on the changes after the Brexit referendum in 2016 since it was a defining moment for firms to decide their investment policies. **Results:** The results are expected to show that Brexit harmed FDI inflows and outflows, considering that the UK and Asian firms saw this phenomenon as a driver for economic instability and uncertainty and were deterred from investing. **Conclusions:** This study unveils that Brexit was responsible for significant spillovers and changed the tendencies of investment patterns between Asian states and the UK. As, before Brexit, London was the financial epicenter of Europe, understanding the shifts helps stakeholders and policymakers plan their investment agendas.

Keywords: Brexit, FDI, United Kingdom, Asia.

21861 | Occupational Segregation in Portugal: Empirical Evidence, 2010-2020

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Gender segregation in the labour market is a phenomenon that gained greater relevance from 1970 onwards, with the increasing participation of women in the labour market (Blau & Hendricks, 1979), mainly because it is considered a process of creating inequalities, especially at the wage level (Reskin, 1993). Using the micro longitudinal database of *Quadros de Pessoal*, collected by the Ministry of Labour, Solidarity and Social Security for the period 2010-2020, we characterize the intensity of the phenomenon of occupational segregation in the Portuguese labour market and its effects on individual wages. Exploring a sample of 2,802,092 observations and the 2010 Portuguese Classification of Occupations (2011) at the 4-digits-level, the Duncan and Duncan index (1955), reveals a decrease in occupational segregation in the last decade in Portugal. However, the degree of occupational segregation is still high, with the index reaching a value of 0.51 in 2019, indicating that 51% of women (or men) would have to change occupation to ensure that the distribution of the two groups in the structure occupation was identical. In addition, and to evaluate the impact of occupational segregation on wages, we use an econometric approach. The estimation results indicate that individuals employed in predominantly female occupations experience a wage penalty when compared to similar workers employed in predominantly male occupations. This wage penalty survives the control for unobserved individual heterogeneity and is slightly higher for men than for women.

Keywords: Occupational Segregation, Gender Inequality, Wage Differences.

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21872 | Is the Book Judged by Its Cover? Unveiling Corruption's Impact on Foreign

Direct Investment in the PALOP economies

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This research studies the impact of corruption on foreign direct investment (FDI) in the PALOP (Portuguese-speaking African countries) economies, over the period of 2006-2018. The pertinence of this study stems from the fact that FDI is an important driver of economic growth in developing countries, especially in sub-Saharan Africa (Boğa, 2019), and, therefore, examining its determinants and, to a greater degree, corruption, is essential to understand the FDI dynamics and implement public policies to enhance FDI. The focus of this analysis lies on the PALOP economies (as of 2018), namely Angola, Cape Verde, Guinea Bissau, Mozambique and Sao Tome and Principe since, according to Transparency International, they exhibit intermediate to low levels on the Corruption Perception Index, not to mention the considerable levels of poverty. Furthermore, these countries share historical and cultural ties, as former Portuguese colonies; yet, despite these factors, no research has focused on the impact of corruption on FDI in the PALOP economies, to the best of our knowledge. To accomplish this, we use regression analysis and, Ordinary Least Squares (OLS) applied to firm-level data, from the World Bank Enterprise Surveys, which gathers microdata for firms, namely variables such as foreign ownership, trade, investment, credit, political obstacles and, corruption. The time spectrum of analysis dates from 2006 to 2018 and the database comprises a total of 2180 observations. The primary aim is to unveil whether corruption poses a challenge to FDI in the PALOP economies or not. Considering these countries have relatively low-quality institutions, we expect corruption to positively impact FDI, as it can feasibly ease bureaucratic processes for investors and facilitate entry into markets by overcoming certain legal obstacles. The results have relevant policy implications, as countries wishing to attract FDI would have to introduce measures that should consider the effect of corruption on FDI.

Keywords: Corruption, Foreign Direct Investment, FDI Determinants, PALOP, Sub-Saharan Africa.

Acknowledgements

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21988 | Geopoliticization of trade: challenges and changes in business strategies

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Background & Aim: One of the primary challenges faced by multinational companies today is the growing influence of the state in the economy, as governments are progressively employing economic policies to accomplish their geopolitical objectives. In this study, the term "geopoliticization of trade" is used to describe this phenomenon. These circumstances indicate that the global economy is at a crossroads. On one hand, globalization has enabled the establishment of global value chains that interconnect markets in an unprecedented manner. On the other hand, the growing geopoliticization of trade raises questions about the future of economic internationalization. In this context, multinational corporations face a business environment characterized by a high level of volatility. Given this scenario, there has been an increase in the amount of literature analyzing how geopoliticization influences the global economic landscape. However, analysis of the impact on business decisions remain scarce. In this manner, this investigation aims to study the impact of this paradigm on strategic decision-making processes within EU multinational companies. **Methods:** This analysis was conducted through semi-structured interviews or questionnaires with executives from EU global companies. However, with the aim of triangulating and corroborating, a content analysis of corporate reports was also performed. **Results:** In a world where levels of interdependence coexist with tensions between countries, transnational companies face a complex array of geopolitical risks. On the one hand, they continue to face the traditional risks that arise from sudden disruptions in supply chains. On the other hand, the risks are systemic and stem from the geopoliticization of trade. **Conclusions:** There seems to be an inescapable reality in the global economy nowadays: economic connections cannot exist outside the geopolitical scenario, and this scenario is changing, predicting an increasingly hostile world for globalized companies.

Keywords: Geopoliticization of Trade, State Intervention, Business, Multinational Companies, Geopolitics.

22034 | The Tax Progressivity Puzzle: Unraveling the Trade-off between Inequality and Growth

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Background & Aim: Tax progressivity has significant implications for both efficiency and inequality, underscoring a trade-off between reducing income disparities and stimulating growth. When studying tax progressivity, empirical research tends to ignore endogenous effects between inequality and growth. Moreover, while theoretical literature suggests multiple channels that influence the impact of tax progressivity on growth and inequality, empirical studies often fail to incorporate these insights. So, it's crucial to analyze the effect of progressivity on these dynamics, considering the interconnected variables. The main goal of the present study, then, is to investigate the impact of tax progressivity on the endogenous and dynamic relationship between income inequality and economic growth, examining the mechanisms underlying these interactions. **Methods:** The ongoing investigation relies on a database of 35 OECD countries, between 2000 and 2019. An IPVAR (Interacted Panel Vector Autoregression) method is employed to delve into the possibility of a shock in tax progressivity influencing the inequality-growth nexus via different mechanisms. This shock may then have distinct impacts depending on several country characteristics such as education, globalization, and the quality of governance. **Results:** The results indicate that the impacts of tax progressivity on growth and inequality differ across countries, offering a reason to why early findings may have been ambiguous. Furthermore, my empirical evidence confirms potential channels advanced by theoretical studies, indicating diverse mechanisms behind the effect of progressivity on the other two variables. **Conclusions:** The results of this study highlight tax progressivity's multifaceted nature. While it may be effective in reducing inequality, its impact depends on the economic context, as well as the social and political circumstances. Understanding these interplays is essential for policymakers to maximize its effectiveness and overcome challenges.

Keywords: Progressivity, Income Inequality, Economic Growth.

22042 | Impact of Tax Incentives on the Quality of Investment in Firms with Financial Constraints in Portugal: An Empirical Analysis

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Tax incentives are widely used for investment, yet empirical evidence on their quality remains scant (Eichfelder et al., 2023; Liu & Mao, 2019). Through the lens of the agency theory, we aim to address this gap by assessing the impact of tax incentives on investment quality in Portuguese small and medium-sized enterprises experiencing financial constraints from 2014 to 2021. Our analysis draws from a set of tax credits and investment allowances: the regime of contractual tax benefits for productive investment; the Fiscal Regime for Investment Support; the system of tax incentives for business research and development II; and the regime for deduction of retained and reinvested profits. Grounded on arguments on the mixed influence of tax incentives and financial constraints, we formally formulate the hypothesis that tax incentives improve (reduce) investment quality in firms with financial constraints. We use data from the Portuguese Central Balance Sheet database and Credit Responsibility Central database made available by the Bank of Portugal. We also use tax incentives data provided by the Ministry of Finance. To measure financial constraints, we assess the credit restrictions facing the company in the ratio between regular and potential credit. We also estimate a proxy of the default spread, across the variable cost of financing obtained is available. To assess investment quality, we follow the perspective of Damodaran (2007) and measure the quality of investment based on incremental Return on Invested Capital. The approach adopted in the research is the difference-in-differences method. The intersection of investment and financial constraints offers fertile ground for scholarly research. The value and strategic use of tax incentives become critical under financial constraints which may impact corporate investment decisions. We expect that the tax incentives will have a positive impact on the investment quality of firms with financial constraints.

Keywords: Tax Incentives, Quality of Investment, Financial Constraints.

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21360 | Women in Manufacturing: Challenges' and Drivers' Influence on Self- and Collaborators' Perceptions as Entrepreneurs

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Background & Aim: Throughout history, women have always been overlooked in favour of men. Even though there are increasing improvements in the area, there is a big gap to fill. More women are assuming empowering roles inside and outside of companies. As such, research must keep up with the evolution to document and permit the exploration of these new additions to society. Hence, there is a growing need to understand how these women are thriving. This study aims at to: i) to identify the challenges women face when venturing into the entrepreneurial manufacturing world, ii) to describe how these challenges influence their self-perception as entrepreneurs', iii) to describe how these challenges influence the direct collaborators' perception of women entrepreneurs. **Methods:** The research approach chosen for this study was qualitative, mainly due to the need to obtain new insights and new perspectives on the research topic (Yin, 2009). More specifically, the case study method focused on a specific in-depth analysis of the analyzed cases which while using the holistic method of case studies employed allowed the study to concentrate on broader subjects instead of fixating on comparing cases (Rowley, 2002). The present research used three main sources for data collection: in-depth interviews, direct observations, and available online documents. **Results:** Among the most important findings, it is notable that the culture, gender equality and institutions of each country impact both the self-perceptions of these women and those of their collaborators. **Conclusions:** The results of this study are relevant not only regarding the impact on society but, more importantly, to companies and their managers to better understand the consequences of these challenges. Likewise, this study's results are valuable to female entrepreneurs that can benefit from new insights and improve their performance and hence, their productivity.

Keywords: Entrepreneurship, Gender Equality, Perception, Manufacturing.

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21845 | Tax Incentives and Investment Efficiency

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Background & Aim: Relying on fiscal policies, governments try to influence the investment decisions of companies; however, the effective impact of these policies on organizations is difficult to measure and assess. In this sense, this study aims to examine the effect of tax incentive policies on investment efficiency. **Methods:** Using a sample of 13,710 Portuguese firm-years from the period of 2014 to 2021 and employing three investment models commonly used in the literature, the optimal investment was predicted for each of the companies and then compared to the actual investment. This comparison reveals a deviation, characterized as inefficient investment (underinvestment or overinvestment), which is the variable to be explained by the main model. The starting point for data extraction was the quantitative reports made available by the Portuguese Tax Authority, through which it was possible to identify the beneficiary companies and how much they were supported. **Results:** The results suggest that the efficiency with which companies carry out their investments increases when they rely on the support provided by the government. In terms of economic significance, these results indicate that increasing tax incentives by one standard deviation increases investment efficiency between 0.003 and 0.008 percentage points. Considering the averages of investment efficiency, this effect represents an increase in investment efficiency between 2.2% and 6.2%. Expanding the research, it was found that the efficiency of investment is conditioned by the liquidity levels of each entity, i.e., when liquidity is extremely low, receiving a tax benefit will not significantly alter the behaviour regarding investment decisions. However, as the liquidity level increases, so does the efficiency with which companies carry out their investments. **Conclusions:** This study has produced evidence that expands and complements the existing literature related to the impact of fiscal policy choices within organizations, proving that investment efficiency increases.

Keywords: Tax Incentives, Investment Incentive, Investment Efficiency, Underinvestment, Overinvestment, Investment in Fixed Assets.

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22017 | Exploring Participation of Muslim Women in Sport: A Systematic Review of Literature

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Background & Aim: The presence of Muslim women in sports has sparked significant debate, encompassing religious, cultural, and gender dimensions. This systematic review aims to provide an overview of the empirical literature on the determinants influencing Muslim women's participation in sports. **Methods:** Employing the search query "muslim AND (wom*n OR femal*) and sport*," a comprehensive search across Scopus and B-on databases was conducted, targeting articles and research papers published from 2000 to July 2023. Thirty-two articles met the inclusion criteria and were categorized into three main themes: (1) Muslim women as athletes, (2) Muslim women in sports management, and (3) Muslim women and girls in physical education and physical activity. **Results:** The findings highlight the myriad challenges faced by Muslim women and girls, emphasizing the necessity of addressing cultural, religious, and gender-specific barriers that influence their engagement in various sports-related areas. **Conclusions:** The review underscores the urgency for more inclusive policies and initiatives within the sports industry to foster diversity and empower Muslim women to participate actively as athletes, sports managers, and physical education practitioners. Future research endeavors should delve deeper into this realm to cultivate a more inclusive and equitable sports environment for Muslim women worldwide.

Keywords: Muslim Women, Athletes, Sport Management, Physical Education, Gender Equality.



ENGINEERING

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21375 | Extraction elements from Clinical Narratives using Ontologies

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Background & Aim: This study delves into the automatic analysis of clinical texts, rich in medical narratives, encompassing background, symptoms, exams, and treatments. The unstructured nature of text and diverse medical terminology [1] pose challenges to information extraction tools. The focus of our work is on assessing how ontologies enhance the structuring and extraction of clinical information for better healthcare data interpretation. Two existing information extraction frameworks that use ontologies for the effective organization and interpretation of clinical data are: COBIE (Clinical Ontology-Based Information Extraction) [2] and N2K Mapper (Clinical Narratives to Knowledge Graph Mapper) [3]. While COBIE focuses on clinical data extraction, N2K Mapper is responsible for mapping, connecting, and integrating information within a diagnostic decision support system, where clinical data is analyzed to assist healthcare professionals in making accurate diagnostic decisions. Both play crucial roles in healthcare, providing a solid foundation for clinical information extraction and facilitating text comprehension and analysis, thus contributing to the improvement of healthcare practices. The primary objective is to extract and structure clinical information using ontologies, aiming to provide healthcare professionals with quicker access to information, enabling aggregated analyses, and offering insights into treatment effectiveness. For instance, having readily available structured information for new patients with similar diagnoses facilitates decision-making for physicians. **Methods:** Using a dataset comprising 1750 clinical reports from 200 Acute Myeloid Leukemia (AML) patients, the initial step of the study involves the application of advanced techniques such as Named Entity Recognition (NER) and Semantic Role Labeling (SRL), utilizing frameworks of natural language processing like spaCy and AllenNLP. Additionally, BERT-based models, specifically Snowlabs' Diagnostic model, were employed to extract and identify disease mentions. Furthermore, texts from electronic health records, annotated by specialists, will be used to train supervised machine learning algorithms, which will be employed in extracting relevant elements from new, unseen texts. Ontologies, such as the Unified Medical Language System (UMLS) and PICO (Patient, Intervention, Comparison, Outcome) [4], play a crucial role in two stages. Firstly, they aid in extracting relevant terms from the texts, linking them to their

clinical codes. Subsequently, they are used to connect the extracted terms as a knowledge graph that displays an organized structure of the extracted clinical information. **Results:** The initial findings illustrate the effective extraction of relevant elements using tools such as spaCy, highlighting enhanced accuracy, particularly evident when applied to medical datasets like medSpaCy. Models such as BERT demonstrate effectiveness in disease identification. The process of mapping extracted terms to the UMLS improves document interoperability and retrieval, with notable support for multiple languages, including Portuguese, a feature not provided by the PICO ontology, which utilizes the Cochrane Linked Data Vocabulary. **Conclusions:** This study aims to establish a standardized structure for representing clinical data, with an initial focus on Acute Myeloid Leukemia (AML). The proposed methodology, incorporating advanced techniques and ontologies, is designed for scalable extension to cover various diseases and diverse medical institutions. The achieved harmonization and enhanced interoperability significantly contribute to organizing and structuring data, resulting in improved efficiency in clinical practice and health research.

Keywords: Acute Myeloid Leukemia, Clinical Texts, Ontologies, Information Extraction, Clinical Narrative Extraction.

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21423 | Treatment of wine distillery effluents using advanced oxidation processes

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Background & Aim: The high phenolic load of wine distillery wastewaters makes standard biological reactors insufficient to comply with the ever-stricter environmental legislation of producer countries. An effective and cheap complementary fine-tuning technique is, thus, needed. The aim of this work is to optimize the operating conditions of the homogeneous Fenton process for this treatment. In doing so, it is intended to expand the ground of research done for this often-overlooked branch of the wine industry [1]. **Methods:** The media's pH and temperature are consulted with a WWT Sentix 81 combined electrode. Iron salt catalyst ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) and H_2O_2 (30% m/V) are added to a stirred glass batch reactor containing 200 mL of a lab-made synthetic effluent. Samples are periodically taken to determine both TOC (total organic carbon) and TPh (total phenolic compounds), deemed the most critical parameters. TOC was determined through Method 5310 D, while TPh was determined through Method 5550 [2]. **Results:** Firstly, the reaction time was evaluated, where the TPh and TOC reductions increased with reaction time for the first 60 min and remained partially constant until 120min. A further reduction of 42.4 % in the TOC and 68.3% in the TPh was achieved with a gradual addition of the H_2O_2 (along 15-minute intervals up to 60 min.), instead of the direct addition previously used, as compared in Figure 1. Finally, a parametric study was performed, and maximal TPh and TOC reductions of 76.6% and 48.3%, respectively, were reached for an initial pH = 4.0 and T = 35 °C. **Conclusions:** The method shows good performance. Looking to establish a checkpoint timeline for the best operatory conditions, additional parameters in the performance are being prepared for analysis. Namely, catalyst to H_2O_2 concentration ratio, as well as their individual concentrations. Future work with real effluents will then be done to corroborate these results.

Keywords: Fenton Process, Wastewater Treatment, Best Operatory Conditions, Distillery.

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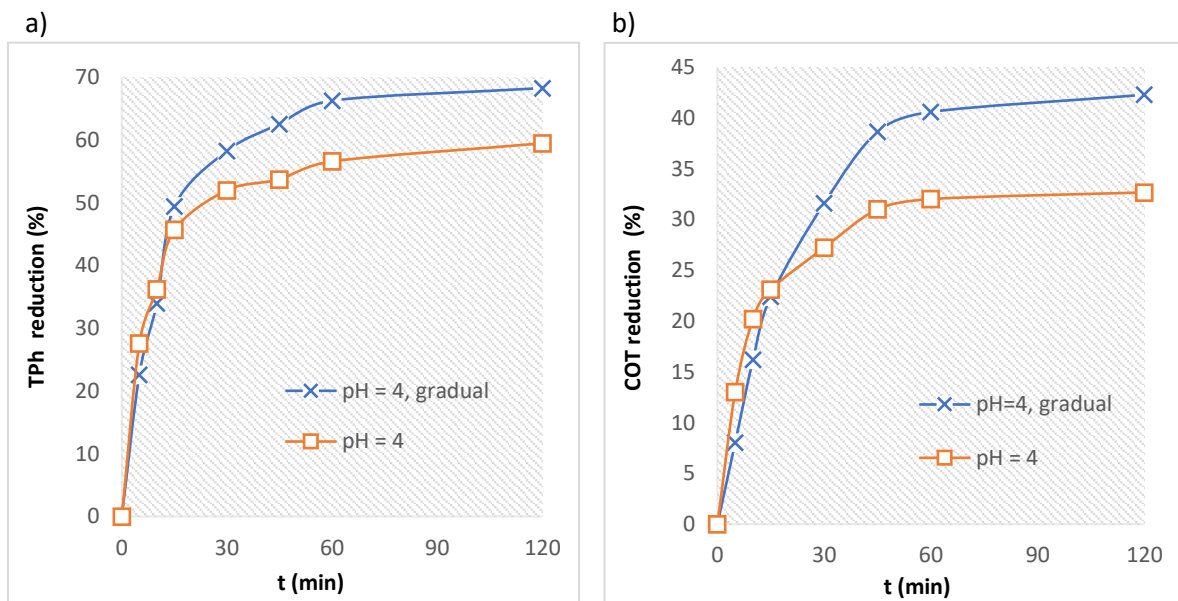


Figure 1: TPH (a) and TOC (b) removal along reaction time ($T= 25\text{ }^{\circ}\text{C}$, $[\text{H}_2\text{O}_2] = 8.5\text{ g/L}$ and $[\text{Fe}^{2+}] = 850\text{ mg/L}$).

21435 | Leveraging CRM Insights to Improve Operations: Identifying and Analysing for Bias in Model Training in a CRM's AI

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Background & Aim: Our research leverages customer relationship management (CRM) insights to improve operations, with a specific focus on identifying and addressing bias in model training within CRM systems' Artificial Intelligence (AI). Specifically, we investigate Salesforce CRM, with its AI assistant, Einstein. Our work aims to uncover and understand biased prevention mechanisms within Einstein, thereby advancing the understanding and mitigation of bias in AI-driven CRM systems. **Methods:** To achieve our objective, we conducted a thorough analysis involving extensive feature testing utilizing a diverse range of algorithms available in Einstein's portfolio. Additionally, we employed various performance metrics and evaluators to comprehensively assess the effectiveness of different approaches in mitigating bias. Our investigation also involved a detailed examination of the mechanisms for bias detection within Salesforce's Einstein, with a focus on elucidating the criteria for triggering a 'bias alert' for variables within datasets. We rigorously trained different models and iterations using the Census Income dataset from UC Irvine's Machine Learning repository (using 32560 observations), constructed with all demographic variables to provide better insights into Salesforce's Einstein's readiness in handling various forms of data, particularly demographic data that may potentially enable biases. **Results:** Our findings reveal insights into the presence of biased prevention mechanisms within Salesforce's Einstein. Through extensive feature testing and performance evaluation, we can identify if these mechanisms are well executed and impactful in real-world scenarios. Additionally, our analysis sheds light on the operational mechanisms of bias detection tools within CRM platforms, contributing to a deeper understanding of bias detection criteria in the field. **Conclusions:** In conclusion, our research underscores the importance of addressing bias in AI-driven CRM systems and highlights the need for further research in bias mitigation techniques. Moreover, our work has the potential to impact the development and deployment of unbiased predictive models in various fields such as sales, service, and marketing fields within CRM environments.

Keywords: Bias, CRM, Salesforce Einstein, AI.

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21493 | Colorimetric-based System for Carbon Dioxide Assessment: Sensitive Membrane Optimization

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Background & Aim: Carbon dioxide (CO₂) holds paramount significance in nature, serving as a vital component in Earth's ecosystems. Its evaluation and regulation have become increasingly important across various sectors, spanning from environmental conservation to industrial operations, ranging from in water-based environments including river and lake monitoring to food industry, particularly in aquaculture applications being open or closed systems [1, 2]. Its assessment is vital for maintaining water quality and ensuring optimal conditions for sustainable and healthy fish growth [3]. **Methods:** Here is investigated the utilization of p-nitrophenol (pNPh), a well-known pH colorimetric indicator, as a sensitive material targeting CO₂, by changing its chemistry and fabricating very thin membranes. The membrane's sensitivity to CO₂ is linked through the formation of an ion-pair, arising from the interaction of pNPh with a phase transfer agent (TOA-OH). The experimental setup consists of a LED emitting at a blue wavelength (460nm) to serve the purpose of detection band and another at a red wavelength (645nm) to work as a reference signal. The light emitted by the LED system passes through the membrane, which is then collimated onto an optical fiber, guiding the light to the spectrometer. By analyzing the received light spectrum, it is possible to accurately measure the presence of CO₂ after a proper calibration. **Results:** To optimize the sensitivity, several concentrations of the reagents were systematically tested, and higher sensibilities were achieved by adjusting the molar ratio of TOA-OH and pNPh. It was possible to conclude that the greatest increase in sensitivity is observed when the concentration of the colorimetric indicator increases even with a reduction of the molar ratio TOA-OH/pNPh. **Conclusions:** The enhancements introduced in the sensing membrane carry substantial implications for CO₂ detection, facilitating the advancement of sensors characterized by increased accuracy and precision.

Keywords: Carbon Dioxide, Optical Sensor, Colorimetry, Aquaculture.

Acknowledgments

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a)	Molar Ratio ^a	[pNPh] (mmol)	Slope ^b	R ²
Membrane M ₁	20	40	11	0.99
Membrane M ₂	15	65	14	0.99
Membrane M ₃	30	35	9	0.99

^aMolar Ratio TOA-OH/pNPh; ^bSensitivity ($I_{\text{blue/red}}/\% \text{CO}_2 \times 10^{-3}$)

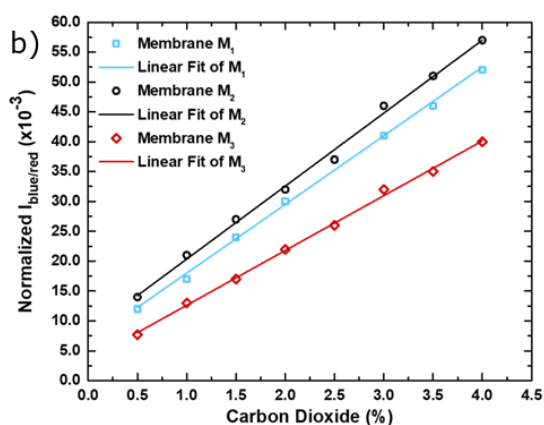


Figure 1: a) Information about the fabricated CO₂-sensitive membranes, including their molar ratio and colorimetric material concentration b) Calibration curves for the three fabricated membranes M1, M2 and M3.

21501 | Assessment of the impact of mixed reality tools in surgical practice and training

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Background & Aim: Mixed reality (MR) is a technology which combines the real and the virtual world. This is a promising tool, in which headsets, such as the Microsoft HoloLens 2, have been used in surgery. This study delves into the exploration of MR tools and their relevance in surgery. Additionally, the work outlines the design of a national Delphi study and the development of a case study, focusing on applying MR to orthopedic surgical training. **Methods:** A search query was directed in 2 different databases, with a total of 113 results (Figure 1). Excluding duplicates and articles not found relevant, a total of 35 articles were reviewed and analyzed. This process was aided with the Rayyan platform. The Delphi study is being conducted since January 2024. Participants were selected based on their experience with immersive technologies when applied to surgery. The 1st round has been created. Its insights will be vital in the requirements gathering phase of the MR application, which will be developed using Unity. **Results:** Through the state-of-the-art analysis, the potential of MR in surgery was shown. The Delphi study was validated by 3 experts and the answers of the 1st round are being collected and will be analyzed. The MR application will be tested in a simulated scenario using Sawbones. It is expected this tool will be a safe resource for surgical training. **Conclusions:** The main uses of MR in surgery consist in the use of 3D models from the patient's anatomy, viewed in HoloLens 2, as well as surgical training and simulation. Ethical concerns might be eased in using these tools in surgical training, instead of intraoperatively. Issues with eye fatigue may be solved in combining MR with 5G technology. Despite having its challenges, MR technology has several benefits when applied to surgery, namely an increasing safety, accuracy, and confidence from the doctors when performing the procedures.

Keywords: Extended Reality, Microsoft HoloLens 2, Orthopedic Surgery, Surgical Training, Delphi Study.

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Moreover, the insights from Lúcio Lara Santos (Ph.D, Professor) proved to be crucial.

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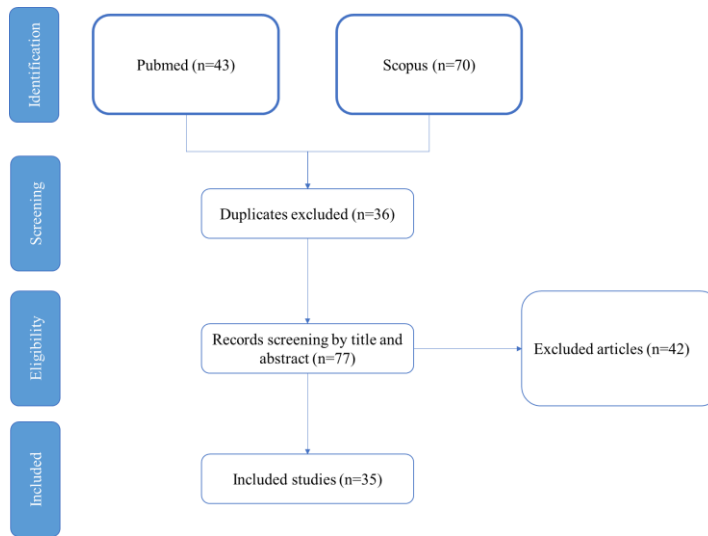


Figure 1: Flow diagram showing the state-of-the-art analysis, exclusion process, and included articles in the review.

21507 | Assessment of the durability and environmental impact of dark-coloured façade finishing coatings with nanomaterials inclusion

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Background & Aim: Despite playing a crucial role in building durability, façades are highly exposed to dust and UV radiation degradation. Dark coatings, chosen for aesthetics, reduce solar reflectance and raise surface temperature. To counter degradation, nanomaterials can be added to these coatings to improve solar reflectance without altering colour, enhancing performance and durability by reducing solar radiation absorption and minimising thermal fluctuations. This study evaluates the durability and environmental impact of dark ETICS finishing coatings containing reflective nanomaterials under natural weather conditions. **Methods:** A full-scale prototype will evaluate dark-coloured finishing coatings with reflective nanomaterials in Porto's weather conditions. It will include 3 coating types: standard, TiO₂-coated F1, and nanocomposite-coated F2. Continuous monitoring will track surface and mechanical property changes. Environmental impact analysis will use GWP and ADP-ff indicators with three different insulations. **Results:** During the prototype construction, reflectance measurements on the 3 coatings were conducted, varying between the standard coating at 11.6%, the F1 coating at 14.8%, and the F2 coating at 18.2%. Different thicknesses were fixed to ensure equal thermal transmission coefficient among the 3 systems for environmental impact analysis: 4 cm EPS, 4.2 cm mineral wool, and 4.5 cm black cork agglomerate. For these thicknesses, we found that the black cork agglomerate had the best GWP, and mineral wool had the best ADP-ff. **Conclusions:** Analysing the data, including nanomaterials enhances reflectance, reducing surface temperature range and potential thermal stress, thus enhancing system durability. Regarding environmental impact, determining black cork agglomerate as the best is inconclusive due to unavailable market insulation panel thicknesses. Compliance with the thermal transmission coefficient requires a greater thickness, which will worsen environmental impact indicators.

Keywords: ETICS, Coating, Façade, Reflective Nanomaterials, Durability, Environmental impact.

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Project NIRWall financed by BIP Proof – University of Porto

21510 | Optimization of high energy density and sustainable electrolytes for redox flow batteries

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Background & Aim: With the massification of renewable energy technologies, dealing with intermittent energy generation has become a main concern. Redox flow batteries (RFB) have emerged as a promising technology for large-scale stationary energy storage. They stand out amongst other technologies owing to their potential to scale power and energy separately. However, their biggest challenge is still its low energy density [1]. The most matured and already commercialized RFB is the all-vanadium RFB, however, it presents some disadvantages. New alternatives have been studied to give higher power and energy densities, in a more environmentally sustainable format. **Methods:** In this work, alternative ferrocyanide and polysulfide electrolytes were investigated, with their redox couples being $\text{Fe}(\text{CN})_6^{3-}/\text{Fe}(\text{CN})_6^{4-}$ and $\text{S}_2^{2-}/\text{S}^{2-}$, respectively, in a 25 cm² electrochemical cell. This RFB system has a mild pH, utilizes only abundant materials, and is non-dangerous for the environment, being also very cost-effective, safe, and scalable [2]. Polysulfide is an electrolyte known for its high capacity, high solubility, and low-cost. Ferrocyanide salts are another promising electrolyte since they are very cost-effective and have high redox potentials and kinetics. However, due to its low solubility, only recently, higher energy densities are starting to be reported [3]. Herein, higher solubility was achieved by studying the modification of the counter ion of the ferrocyanide salt. Other improvements were also performed to the system to optimize the RFB. **Results:** With the different improvements done to the RFB, better efficiencies were achieved. The most important improvements were conducted by changing the membrane - about a 40 % increase in energy efficiency at 10 mA/cm²; and with $(\text{NH}_4)_4[\text{Fe}(\text{CN})_6]$, which had a 10 % increase in energy efficiency compared to $\text{K}_3[\text{Fe}(\text{CN})_6]$. **Conclusions:** In this work, better efficiencies were achieved, showing the optimization done to the RFB increased the system performance.

Keywords: Renewable Energy Storage, Redox Flow Batteries, Off-Grid Electrification, Electrochemical Fuels, Ferrocyanide, Polysulfide.

Acknowledgments

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21543 | Impact of Nanoparticle Incorporation in Dark Coatings for ETICS

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Background & Aim: Currently, there is an increasing trend in the use of dark-coloured finishing coating solutions in façades due to a rise in architectural and design requests. The main disadvantage is the high solar absorption that occurs when using these dark colours, which can result in a durability decrease due to the higher surface temperatures. Therefore, incorporating functional nanomaterials in finishing coatings that could reflect part of the solar radiation and even the matching colour primer, specifically in the NIR region, would considerably improve façade durability. **Methods:** Thus, this study will investigate the optical properties of a dark-coloured finishing coating and a matching primer, which will be applied to an Exterior Thermal Insulation System (ETICS). These coatings will be composed of reflective nanomaterials, including Titanium Oxide (TiO₂) with 50 nm size, in varying concentrations (0%, 3%, 5%, and 8%). The study will evaluate the coating's optical properties, including reflectance, emissivity, and colour. The objective is to enhance the NIR reflectance of the coatings without significantly altering the original darker tones. To evaluate this, modular spectrophotometer tests will be conducted, followed by an accelerated ageing test to analyse any variations in optical and thermal properties. **Results:** An optimised TiO₂ formulation is expected to directly increase the reflectance and improve the coating thermal performance. An improved combination of primer-coating can contribute to the long-term durability. After conducting some reflectance and colour tests with the modular spectrophotometer, it can be inferred that, in the majority of the formulated samples reflectance increases both in the infrared spectrum and in the visible spectrum, consequently leading to an overall increase in total reflectance. Despite these reflectance tests proving quite favourable, a significant difference in tone was immediately noticed during the fabrication of the samples. Initially, the primer colour RAL 7016 was chosen for this study, but it quickly shifted from a dark grey anthracite colour to a lighter grey. As a result, a slight colour adjustment was made by adding pigment pastes in an attempt to closely match the original colour after the incorporation of nanomaterials. The colour adjustment was only performed on the 3% and 5% samples because the sample incorporating 8% of titanium dioxide did not demonstrate results as favourable as those with less doping, and since this colour

adjustment is time and resource consuming, it was decided to only adjust the previously mentioned colours. Consequently, it is concluded that there is indeed an improvement in reflectance with the incorporation of titanium dioxide, especially in the NIR, a region that will dictate the durability of the final finishes, while the reflectance in the visible spectrum mainly translates into a change in the primer colour becoming progressively lighter. As a result, in the sample without any doping, the total reflectance is 15.8%, the NIR reflectance 17.1% and the visible of 14.2%. The most favourable results include the improvement of the total reflectance on the sample doped with 5% of titanium dioxide (24.59%) and on the 8% sample (also 24.59%). On the other hand, the sample with 5% TiO₂ that suffered colour adjustment, has the best values regarding the NIR reflectance with 25.54%, showing a significant improvement compared to the original sample. In the matter of the visible reflectance, the 8% sample has the biggest percentage with 25.87% of reflectance, due to the drastic change in the colour. Regarding the colour test, it is observed that doping the primer with nanoparticles, as previously said, significantly affects its tone. Thus, only the adjusted sample with 3% of TiO₂ satisfies the parameter of colour difference being below 3. **Conclusions:** The incorporation of nanomaterials, specifically titanium dioxide, proves to be beneficial in the increase of reflectance in the infrared spectrum, resulting in a reduction of solar absorption by the final finishing, thereby enhancing its durability. This study could demonstrate that dark-coloured finishing coatings on façades might not be as problematic as previously thought. By exploring their impact, we aim to ensure the system's durability and mitigate the concerns about thermal stress from solar radiation.

Keywords: ETICS, Nanomaterials, Optical Properties, Façade, Durability.

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21569 | Development of Carbon Dots as Fluorescence Probes for Bioimaging

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Background & Aim: Bioimaging allows real-time and non-invasive visualization of biological events using probes and detectors, thus supporting medical diagnoses and treatments, and driving scientific discoveries in various disciplines. The high fluorescence emission and photostability makes carbon dots (CDs) ideal candidates for bioimaging applications. These can be used as fluorescence probes to mark and track specific cells, tissues, and biomolecules, but also to screen the crossing of cells and/or tissues. The main objective of this work is to develop CDs to be used as fluorescence probes to screen the blood-brain barrier (BBB) permeability.

Methods: The CDs were prepared by adapting a microwave-assisted method employing citric acid, urea and sodium fluoride as the precursors [1] and characterized by UV-Vis, Raman, and Fourier transform infrared (FTIR) spectroscopies, quantum yield (QY) and confocal microscopy. For the bioimaging tests, the CDs were added to a biomembrane (3D hydrogel) seeded with endothelial cells from the human umbilical vein (HUVEC-GFP). **Results:** A successful synthesis of CDs was confirmed by UV-Vis and Raman spectroscopies. The ability of the CDs to emit different colours when subjected to laser irradiation at different wavelengths was also shown (Figure 1), which is an important feature for bioimaging applications. The CDs presented QY up to 25.4%, the best performing sample being screened as a possible bioimaging tool to evaluate the permeability of the constructed 3D BBB model. The cell network in the hydrogel (BBB) is illustrated in Figure 2a. Next a drop of a CDs suspension was added, and after 1 and 10 min, images Figure 2b and 2c were collected, respectively. As observed, the cells become more fluorescent along the time, suggesting that the CDs were able to permeate the hydrogel. **Conclusions:** The prepared CDs have the potential to be used as a bioimaging tool to screen the BBB permeability. Nevertheless, more research is needed to validate our observations.

Keywords: Microwave Method, Multicolour Emission, Nanomaterials, Photoluminescence.

Acknowledgments

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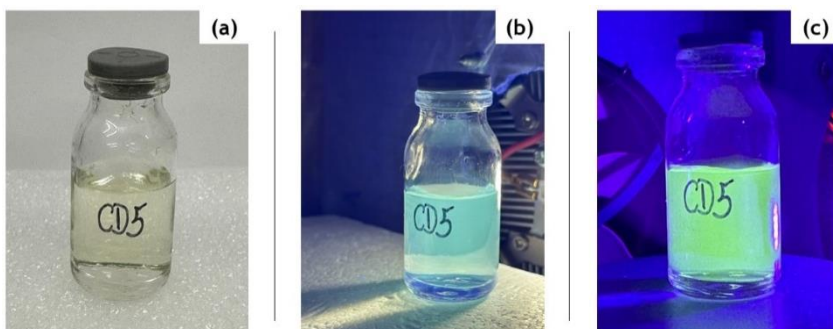


Figure 1: Images of the aqueous suspension prepared with a sample of CDs (referred to as CD₅) when subjected to (a) natural light, and (b) 365 nm and (c) 401 nm LED radiation.

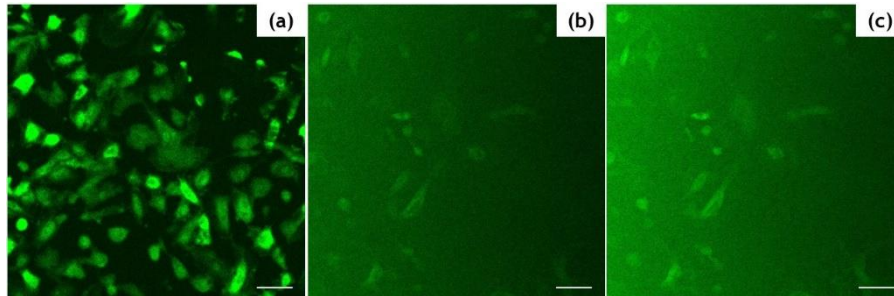


Figure 2: Images obtained by confocal microscopy analyses, where (a) depicts HUVEC-GFP cells in biohydrogel after 7 days of culture, and (b) and (c) were obtained 1 and 10 min after the addition of a CD₅ suspension to the cells/biohydrogel, respectively. The laser with a wavelength of 488 nm was used for image collection, with a 10x objective. Images post-processed using Image J.

21633 | Durability assessment of ETICS multilayer façade solutions

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Background & Aim: Since about 40% of the pollution is caused by the construction industry, the building materials must improve performance to decrease defilement [1]. That is why the European Union has a specific regulation for the thermal and environmental impact of buildings [1]. With that in mind, this project has the objective of understanding the durability of ETICS (External Thermal Insulation Composite System) incorporating nanomaterials in finishing coatings since they're known for their high reflectance, which helps reduce the absorptance of radiation even in dark-coloured facades [2]. It also can help lower the high temperature of the system since previous studies have made it clear that this technique can reduce the superficial temperature between 6 and 20°C [1]. **Methods:** For that study, relevant measurements were made such as reflectance and colour parameters, both with a spectrophotometer, and emissivity in different aged samples of ETICS. The reflectance and the colour, and emissivity were determined according to ASTM E 903-20 and the CIE Lab colour space, and ASTM C 1371-04a, respectively [3-5]. **Results:** The results confirmed that the incorporation of these pigments helps the system retain less solar radiation by reflecting and emitting most of it, without changing the colour of the finishing coat. It also proved that these changes can increase the durability of the materials, expanding the building's lifespan. **Conclusions:** In summary, the incorporation of nanomaterials in ETICS can lower the absorptance and colour difference, which makes the system last longer and even reduces the production costs.

Keywords: ETICS, Nanomaterials, High Reflectance, Colour, Durability.

Acknowledgements

Project NIRWall financed by BIP Proof – University of Porto.

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21668 | Fire Education Platform – Improving Engagement through Interactive Technologies

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Background & Aim: The communication of Wildfire knowledge on the web is extensive, with a vast number of credible sources distributing information on the topic. However, most of the content available is targeted towards specialists, researchers, and stakeholders, failing to engage wider non-specialized audiences [1,2](#). Integrated into the FIRE-RES Project, our goal is to create a Fire Education Platform that aggregates information on Fire resilience directed towards different target audiences: Fire Researchers and technicians, Educators, Students and Teachers. We aim to understand how Multimedia Interactive Technologies can improve Engagement [3-7](#) and make Fire Knowledge more accessible and intuitive. **Methods:** The study was organized into two phases. The first phase is finished and focused on understanding the proposed problem and target audience, with a mix of traditional and user-centered research methods: 1) Literature Review on the state of Fire Knowledge Communication on the web and possibilities of Multimedia Technologies, 2) UX Benchmarking of existing solutions, 3) online survey to understand user's needs and motivations, and 4) ideation session and conception of a prototype in co-creative and collaborative design sessions. The outcomes will be subject to the second phase: design and test of high-fidelity prototypes. **Results:** The survey gathered 692 answers, and a compilation of Fire Knowledge websites and platforms were analyzed by taking into account the findings from the Literature Review, data collected from the survey, and the co-design session with stakeholders. Analysis revealed the potential of Digital Technologies in Science Communication, emphasizing gamification, interactivity, and narratives to enhance information dissemination. **Conclusions:** These results demonstrate that adopting a user-centered approach facilitates content adaptation to users and increases engagement, accessibility, and knowledge retention.

Keywords: Wildfire Education; User Experience Design; Multimedia; Communication of Science.

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21677 | Biomass: A sustainable source for aviation fuel production

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Background & Aim: There has been a growing effort to reduce the use of fossil fuels, and biomass appears to be a sustainable alternative that could replace oil derivatives due to its low cost [1,2,3]. **Methods:** The process of converting palmitic acid (a microalgae bio-oil model compound) through a hydrodeoxygenation reaction was studied, where the main goal was the formation of hydrocarbons in the aviation fuels range (C₈-C₁₆). So, bi- and monometallic catalysts composed of 1-4% Mo and 2.5-10.5% Ru supported on carbon nanotubes (CNT) were synthesized. These materials were characterised by temperature programmed reduction and N₂ adsorption isotherms. Catalytic tests were carried out, in which 0.5 g of palmitic acid, 50 mL of solvent (decane or dodecane) and 0.25 g of catalyst were introduced into a Parr batch reactor under stirring at 150 rpm and H₂ pressure of 30 bar. After heating to 350 °C, the reaction was started and carried out for 6 h, after which the reaction mixture was analysed by gas chromatography-mass spectrometry. **Results:** The conversion of palmitic acid and the yield of hexadecane (C₁₆) were calculated, and the effects of the support (CNT and CNT_{ox}), solvent and metal content were assessed. The catalyst metal content proved to be a determining factor to obtain a higher C₁₆ yield. Among the prepared monometallic catalysts, 10.5%Mo/CNT and 2.5%Ru/CNT_{ox}, the former led to the formation of 29.7% yield of C₁₆ and 84% conversion of palmitic acid, while the latter resulted in a C₁₆ yield of 3.1% and complete palmitic acid conversion. As for the other parameters evaluated, it was concluded that the use of CNT_{ox} as support and decane as solvent did not significantly affect the results obtained. **Conclusions:** The catalysts with a higher metal content, 2.5%Ru-10.5%Mo/CNT_{ox} and 2.5%Ru-10.5%Mo/CNT, allowed to attain the best results: 60.2% and 57.6% yield of C₁₆, respectively. These results show that biomass could possibly be used to produce sustainable aviation fuels in the future.

Keywords: Palmitic Acid, Hydrodeoxygenation, Heterogeneous Catalysts, Aviation Fuels.

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21750 | Production and Characterization of Nanoparticles Loaded with the Antibacterial Agent Naringenin

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Background & Aim: Bacterial infections are still a persistent global problem associated with high morbidity and mortality. The increase in resistance mechanisms, specifically in *Staphylococcus aureus* (*S. aureus*), is a challenge that affects the treatment of bacterial infections, therefore alternative therapies are needed due to the lack of effective therapies. Naringenin (NRG) (Fig. 1A) has shown promising results for treating bacterial infections caused by *S. aureus* [4]. However, due to its low bioavailability and reduced ability to cross biological barriers, including bacterial envelope, NRG's antibacterial properties *in vivo* remain limited. Thus, this work proposes the encapsulation of NRG into polymeric and lipid-based nanoparticles (NPs) to overcome the NRG's limitations, thus improving its therapeutic activity against *S. aureus*.

Methods: NRG-loaded poly(lactic-co-glycolic acid) (PLGA) NPs (Fig. 1B) and NRG-loaded nanostructured lipid carriers (NLCs) (Fig. 1C) were produced by the single emulsion method and high-shear homogenization technique, respectively. The NPs' size, polydispersity index (PDI), and zeta potential were investigated by dynamic light scattering and electrophoretic light scattering, respectively. **Results:** NRG-loaded PLGA NPs presented mean sizes of 167 ± 5 nm, a PDI of 0.06 ± 0.02 , a zeta potential of -18.7 ± 0.4 mV, and encapsulation efficiency (EE) of 45 ± 1 %. NRG-loaded NLCs showed sizes ranging from 117 to 137 nm, PDI values below 0.3, zeta potential between -14 and -18 mV, and EE above 95 %. **Conclusions:** NRG-loaded PLGA NPs and NLCs were successfully synthesized and characterized. Both types of NPs exhibited optimal particle size below 200 nm, PDI less than 0.3, and negative zeta potential, considering that the purpose is drug delivery. The EE obtained was significantly higher for NLCs than PLGA NPs, suggesting that NLCs are a preferable carrier for encapsulating NRG. In the future, the antibacterial properties of NRG-loaded NLCs will be evaluated.

Keywords: *Staphylococcus Aureus*, Antimicrobial Resistance, Natural Compound, Polymer, Nanostructured Lipid Nanoparticles.

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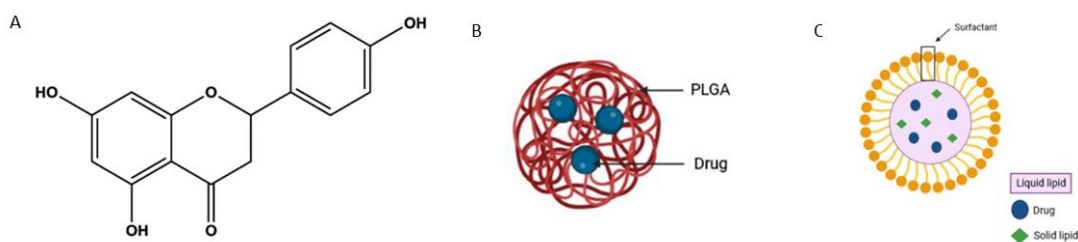


Figure 1: A) Chemical structure of naringenin, B) Representation of drug-loaded poly(lactic-co-glycolic acid) nanoparticles, and C) Representation of drug-loaded nanostructured lipid carriers.

21785 | Development of PLGA nanoparticles for the encapsulation of fluoxetine: a drug with anti-glioblastoma properties

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Background & Aim: Glioblastoma (GBM) is a malignant brain tumour without a cure and a short survival rate. The alkylating agent temozolomide is the gold-standard treatment, however this drug shows high toxicity to healthy cells and resistance to therapy due to the activity of the O⁶-methylguanine-DNA methyltransferase (MGMT) enzyme [1]. Thus, alternative therapies, such as repurposing of non-alkylating drugs, are needed to improve overall survival [2]. This work proposes the repurposing of fluoxetine hydrochloride (FH) – a drug FDA-approved to treat depression - for GBM therapy. Despite its proven anti-GBM properties, FH accumulates in different tissues due to its lipophilic nature [3]. Thus, to ensure its specific brain targeting, poly(lactic-co-glycolic acid) (PLGA) nanoparticles (NPs) are proposed in this work aiming an increased bioavailability and reduced toxicity. **Methods:** FH-loaded PLGA NPs were prepared using a double-emulsion solvent evaporation method. Experimental variables such as the quantity of PLGA and drug, time of sonication, and surfactant concentration were varied to develop a formulation with appropriate characteristics for brain delivery. After production, the NPs were characterized in terms of size, polydispersity index (PDI), and zeta potential by Dynamic Light Scattering and Laser Doppler Electrophoresis. **Results:** The NPs exhibited sizes varying between 139 and 167 nm, PDIs ranging from 0.21 to 0.35, zeta potentials between -18.8 and -14.4 mV, and encapsulation efficiencies (EE) from 17.3 to 39.7%. **Conclusions:** FH-loaded PLGA NPs were successfully prepared and characterized with suitable dimensions (< 200 nm) and surface charge for brain delivery. It was verified that higher EE was obtained when decreasing the amount of drug and increasing the PLGA quantity. Future work will focus on optimizing the NPs by implementing a Central Composite Design to further enhance the EE, along with evaluating their stability and drug release under simulated physiological conditions.

Keywords: Brain tumour, Drug repurposing, Nanomedicine, Poly(lactic-co-glycolic acid), Drug delivery.

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21800 | Magnetic flocculation harvesting in synthetic wastewater: a first approach

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Background & Aim: Microalgae is utilized in diverse fields such as cosmetics, pharmaceuticals, food, and energy (e.g., biodiesel or biofuels). However, their utilization is hindered by inefficient and time-consuming harvesting methods, often lacking a favorable efficiency-to-cost-benefit ratio. Magnetic flocculation-based harvesting emerges as a promising technique that combines coagulation and flocculation processes with magnetic harvesting. This method offers simple separation, low operational costs, and high harvesting efficiencies in a shorter time compared to alternative procedures. This study aims to optimize this harvesting method in synthetic wastewater. **Methods:** The harvesting method involves collecting *C. vulgaris* within synthetic wastewater using Fe₃O₄ particles, polyacrylamide (PAM), and poly aluminum chloride (PAC). The procedure is performed by adding PAM and Fe₃O₄ particles coated with PAC to the microalgae suspension and then all components are agitated during a certain time. After agitation, the microalgae suspension is placed on the top of a magnet, and samples are collected during microalgae sedimentation at certain times. All studies were repeated, independently, at least two times with duplicates ($n \geq 4$). **Results:** A pH range between 6 and 8 demonstrates the highest harvesting. A combination of 2.5 mmol Al/L of PAC, 2 g/L of Fe₃O₄ and 3 mg/L of PAM achieved 90% of harvesting in 2 minutes for a microalgae suspension of 400 mL and 3.0×10^7 cells/mL. Additionally, more than 90% of Fe₃O₄ particles can be recovered after harvesting, and FT-IR spectroscopy reveals no chemical changes in the particles. Increasing Fe₃O₄ concentrations from 1 g/L to 8 g/L does not result in higher harvesting efficiency, and agitation time of 2 minutes shows the highest harvesting efficiency. **Conclusions:** The study demonstrates that PAC, Fe₃O₄, and PAM play efficient roles in the harvesting process. Further optimization efforts can be directed towards agitation velocity and magnetic field.

Keywords: Microalgae, Magnetic Flocculation Harvesting.

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Figure 2- Microalgae coupled with PAC, PAM and the magnetic particles. In this figure is possible to visualize the microalgae following the magnetic field.

21917 | Durability Assessment of High-Performance Concrete with Glass Powder for Façade Cladding

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Background & Aim: High-performance concrete (HPC) stands at the forefront of concrete technology, offering remarkable advancements in various applications. A use of HPC is the creation of thin architectural elements. Traditionally, HPC formulations rely on Portland cement and supplementary cementitious materials (SCMs) like slag, fly ash, silica fume, and limestone. For architectonic HPC white cement is used that raises economic, technical, and environmental issues. In regions like Portugal, the availability is limited, so the integration of locally sourced SCM is imperative to reduce costs and cut CO₂ emissions associated with production. The use of waste or industrial by-products (glass powder) will be a path towards a more sustainable and circular concrete. **Methods:** The experimental characterization involves assessing mechanical strength through tensile and compression tests, alongside examining surface properties such as reflectance, color and emissivity in concrete specimens before and after an accelerated aging test. **Results:** The surface properties showed that the studied HPC presented similar values to other light-coloured concretes. Average values of around 60% for UV-Visible reflectance, 24.5 for lightness and 0.88 for emissivity were measured. Regarding mechanical properties, an average value of 94.05 MPa at 28 days was obtained. The properties are expected to remain stable post-aging, leading to increased durability and lower maintenance. This evaluation will provide insights into the long-term performance and reliability of the material. **Conclusions:** The work demonstrates that integrating locally sourced SCMs like glass powder into HPC formulations offers a sustainable and circular approach to concrete production. These findings significantly impact the advancement of sustainable concrete technology practices and promise to enhance material reliability in architectonic applications.

Keywords: HPC, Glass Powder, Sustainable Concrete, Façades, Durability.

21922 | The impact of different layers on the durability of ETICS - hygrothermal and optical performance of façades

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Background & Aim: One of today's biggest problems is global warming, which is caused by CO₂ emissions. To achieve low-carbon construction and reduce the impact that the construction industry has on the environment, it is important to build in a more sustainable way. To do this, it is important use materials that will help make the building more energy-efficient and have a low environmental impact, thus reducing the building's ecological footprint. It is also important to make buildings less dependent on electricity to provide thermal comfort to users, and this can be done through better thermal insulation. This work focuses on external thermal insulation composite systems (ETICS) and aims to test and evaluate how the materials that constitute some of the different layers of this façade system impact the hygrothermal and optical performance of façades. **Methods:** The regularization mortar layer, the primer and the finishing coating layers will be tested. To assess the performance of these layers, properties such as reflectance, colour, emissivity, and heat flow will be measured. **Results:** The results showed that the different combinations of layers have little impact on the emissivity of the ETICS, since values between 0.91-0.92 were obtained for all configurations. For the reflectance of dark-coloured samples, values were between 10%-20%, which is in line with values obtained in the literature of around 13%, while for light-coloured samples, values were between 40%-60%. In the colour test, following the CIE Lab system, were obtained values around 75 for the L*, around 2,5 for the a* and between 12-16 for the b*, for the light-coloured samples. For the dark samples, the L* values were around 46 and the a* and b* values between 0-1.5 and 0-2. **Conclusions:** With these results, the aim is to find the optimum combination of layers that will not only reduce energy consumption due to the reduction in surface temperature but will also optimise the consumption of materials.

Keywords: ETICS, Reflectance, Façades, Hygrothermal Performance.

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21948 | Exploiting natural compounds loaded into lipidic nanoparticles to prevent skin aging

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Background & Aim: The skin is a complex and dynamic organ that plays a crucial role in protecting our body from the external environment, namely intrinsic and extrinsic factors, which influence aging. The use of nanotechnology to deliver natural compounds is one of the solutions aimed at combating skin aging. The work aims to explore the effects of solid lipid nanoparticles (SLN) and nanostructured lipid carriers (NLC) encapsulating three natural compounds for the treatment and prevention of skin diseases and aging: caffeine (Figure 1A), vitamin E (Figure 1B), and docosahexaenoic acid (DHA) (Figure 1C). Caffeine, with its antioxidant activity and potential to protect against UV-induced damage, synergizes with vitamin E, a potent antioxidant known for its photoprotective benefits and ability to promote collagen synthesis. DHA is widely used in indoor tanning products, offering a safer alternative to UV exposure and potential neuroprotective properties in preserving myelin sheaths. The main objective of this work is to produce and characterize nanoparticles (NPs) loaded with natural compounds. To facilitate their application, they will be incorporated into a gel, and finally, their therapeutic effects will be evaluated *in vitro* and, if possible, *in vivo*. **Methods:** The study was divided into several phases, including temperature stability studies, lipid screening, preparation and characterization of NPs, and evaluation of encapsulation efficiency. Through a combination of high-shear homogenization and ultrasonication techniques, SLNs and NLCs loaded with caffeine and NLCs loaded vitamin E and DHA were produced. Their size and polydispersity index (Pdl) were determined by dynamic light scattering (DLS) and the zeta potential by electrophoretic light scattering. **Results:** Caffeine remained stable for a period of 48 hours at temperatures of 4 °C, 25 °C and 37 °C. The SLNs loaded with caffeine (Figure 2A) that present the best properties showed average sizes of 137 ± 4 nm, Pdl of 0.28 ± 0.01 , zeta potential of -13.3 ± 0.5 mV, and encapsulation efficiency (EE) of 65 ± 4 %. NLCs loaded with caffeine showed averages sizes of 154 ± 9 nm, Pdl of 0.38 ± 0.05 , zeta potential of -11 ± 2 mV and EE of 49.47 ± 3.71 %. NLCs loaded with Vitamin E (Figure 2B) presented sizes varying from 143 ± 1 nm, Pdl of 0.25 ± 0.01 , zeta potential between -8 and -10 mV, and NLCs loaded with DHA had mean diameter of 153 ± 7 nm, Pdl of 0.25 ± 0.03 , zeta

potential of -16 ± 2 mV. **Conclusions:** Both SLNs and NLCs have been successfully synthesized and characterized. Both NPs showed ideal size distributions, less than 300 nm. The PDI values for all nanoparticle formulations were within acceptable ranges, with the stipulated value being 0.3. Zeta potential measurements revealed negative values for all nanoparticles, indicating potential stability and minimal aggregation tendencies. Later, the resulting NPs will be incorporated into a hydrogel formulation and the biocompatibility and antioxidant activity of the nano formulations will be evaluated *in vitro* and *in vivo*.

Keywords: Skin Aging, Solid Lipid Nanoparticles, Nanostructured Lipid Carriers, Natural Compounds.

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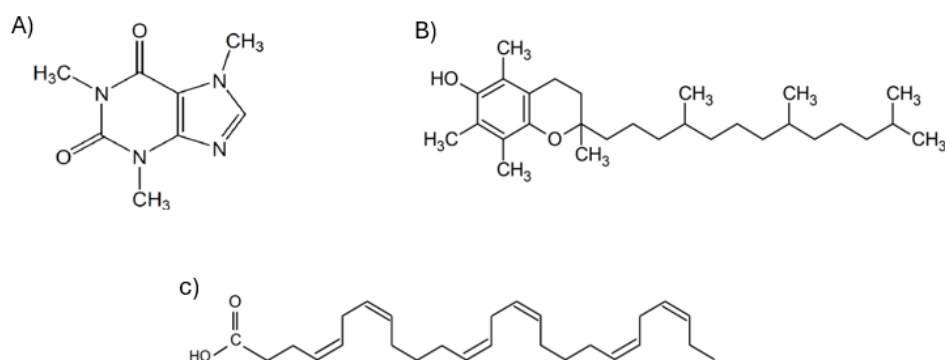


Figure 1: A) Chemical structure of caffeine, B) Chemical structure of vitamin E, and C) Chemical structure of Docosahexaenoic acid.

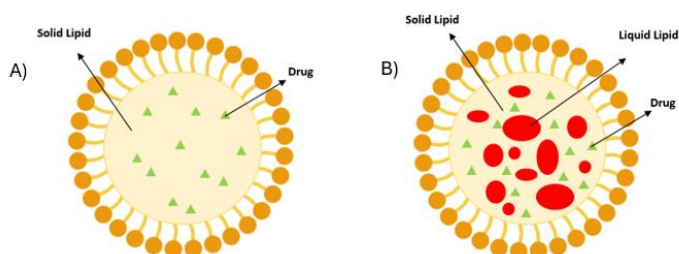


Figure 2: A) Representation of Solid Lipid nanoparticles B) Representation of Nanostructured Lipid Carriers.

21978 | Durability of a high-performance eco-efficient concrete for façade cladding

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Background & Aim: High-performance concrete (HPC) is a technologically advanced material, but poses some sustainability concerns. An HPC was developed, with a massive partial replacement of Portland cement with limestone filler and glass powder as supplementary cementitious materials. Therefore, this work presents a multi-level characterisation of the new eco-efficient-HPC. **Methods:** The experimental methodology comprised 2 phases: initial marking of relevant properties and evaluation of the same properties after accelerated ageing (hygrothermal cycles), which allowed to evaluate the durability. The measured parameters were compressive strength and electrical resistivity. Also, relevant surface properties regarding the façade cladding use were measured, such as reflectance, colour, thermal conductivity, emissivity and liquid water permeability. **Results:** Regarding mechanical performance, HPC reached more than 90 MPa at 28 days. Electrical resistivity increased over time due to the hydraulic reaction of cement and water and then the pozzolanic reaction of GP with portlandite. These hydraulic and pozzolanic reactions lead to a finer pore network and less connection. Resistivity results reached 116 ohm at 28 days, which indicates a compact matrix. The results for reflectance, colour properties, thermal conductivity and emissivity values aligned with expectations. When tested after leaving the wet chamber, which has a temperature of 20° and a relative humidity superior to 98%, the thermal conductivity value is 2.85 W/(m·K), which is slightly higher than conventional concrete (2 W/(m·K)) due to humidity influence. **Conclusions:** HPC properties can thus be reached using conventional and unconventional SCM, namely ternary blends of limestone filler and GP, respectively, as high-dosage cement replacement. Using SCM locally available in HPC production avoids landfill usage and reduces CO₂ emissions by decreasing the cement needs and turning waste into a value-added by-product for local concrete producers.

Keywords: Eco-Efficient Concrete, High-Performance Concrete (HPC), Façade Cladding, Mechanical Behaviour, Durability.

22052 | Stealth Liposomes for the Targeted Delivery of Epigallocatechin for Alzheimer's Disease Therapy

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Background & Aim: Alzheimer's disease (AD) is a devastating neurodegenerative condition with no cure, prompting the urgent need for innovative treatments [1]. It is characterized by amyloid beta (A β) peptide aggregation, which forms amyloid plaques and causes cell death [2]. Epigallocatechin (EGC) holds promise by reducing A β plaque formation but faces challenges such as low bioavailability and blood-brain barrier (BBB) penetration [3]. Nanoparticles (NPs) provide a solution by facilitating effective drug delivery across the BBB and reducing drugs' side effects. This project aims to develop stealth liposomes containing EGC for the therapy of AD. **Methods:** Four lipid formulations made of 1,2-distearoyl-sn-glycero-3-phosphocholine (DSPC), 1,2-dimyristoyl-sn-glycero-3-phosphocholine (DMPC), 1,2-dioleoyl-sn-glycero-3-phosphocholine (DOPC), or 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (PC) combined with cholesterol, and 1,2-distearoyl-sn-glycero-3-phosphoethanolamine-N-[methoxy(polyethylene glycol)-2000] (18:0 PEG2000 PE) were prepared to encapsulate EGC. Liposomes were produced using the thin-film hydration method followed by extrusion. NPs' hydrodynamic diameter, polydispersity index (Pdl), and zeta potential were measured using dynamic light scattering and electrophoretic light scattering, respectively. **Results:** EGC-loaded liposomes, regardless of lipid composition or addition phase of EGC, exhibited mean diameters below 185 nm and low Pdl values (<0.2), indicating homogeneous size distribution. Zeta potential was close to 0 mV, consistent with the zwitterionic nature of lipid components. Encapsulation efficiency was slightly higher when EGC was added to the aqueous phase (14- 22%) than the lipid phase (0 – 8%). **Conclusions:** EGC-loaded stealth liposomes were successfully produced and showed suitable physicochemical properties for brain drug delivery. The results suggest that adding EGC to the aqueous phase is the preferred method for encapsulating it into liposomes.

Keywords: Nanoparticles, Drug Delivery System, Catechin, Green Tea.

Acknowledgments

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ENVIRONMENT



21369 | An unseen threat in water quality: microplastics evaluation in the Aguieira reservoir

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Background & Aim: The proliferation of plastics in aquatic environments stands out as a prominent contemporary concern. These plastics undergo physical, chemical, and biological degradation, resulting in smaller microplastics fragments (MPs; 0.001-5 mm). While marine environments have been a focal point in research on this issue, freshwater ecosystems, particularly reservoirs, have received comparatively less attention. According to the Water Framework Directive (WFD), the ecological potential of reservoirs is determined according to specific parameters (physical, chemical, and biological), in which MPs are not included. Therefore, in an attempt to identify the role of MPs in water quality assessment, this study aimed to quantify and characterize MPs in Aguieira reservoir, and to identify the potential sources of this type of pollution. **Methods:** To achieve these goals, three sampling sites were monitored along one year. Subsurface water samples were collected to determine biological, physical, and chemical parameters according to the WFD approach. A water sample was also collected to analyse MPs in the water column. The MPs recorded were identified based on typology, color, and size. Additionally, a landscape evaluation of the hydrographic basin was conducted regarding land use, soil occupation, and anthropic pressures. **Results:** A total of 1587 MPs were recorded, mostly fibers (>97%), but also fragments, paints, foams, and films. Overall, the site near the dam showed the highest MPs concentration (average of 50 MPs/L), namely in the first sampling of the summer (99 MPs/L). Blue and black were the dominant colors (>66%). The recorded pressures in the study area are WWTP's discharges and surface water catchments, but also navigation and other recreation activities that occur specially in the summer. **Conclusions:** This study underscores the significance of incorporating the assessment of microplastics into water quality frameworks, with a particular emphasis on reservoirs used for human purposes.

Keywords: Microplastics, Water Quality, Reservoirs.

21384 | Beyond the beach: *Escherichia coli* the silence threat to public health

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Background & Aim: *Escherichia coli* inhabits the gastrointestinal tract of warm-blooded animals and is routinely used as an indicator of fecal contamination in recreational waters [1,2]. While mainly commensal, some *E. coli* strains can harbor pathogenic potential, posing a major public health risk (**Figure 1**) [1,3]. This study aimed to investigate the source of the fecal contamination present in recreational waters through the characterization of *E. coli* isolates. **Methods:** Surface water samples were collected from estuarine and coastal beaches. Detection was performed using selective and differential culture media (mFC, CHR agar, Colilert-18). Presumptive *E. coli* isolates were confirmed by PCR. Confirmed isolates (n = 272) underwent virulence gene screening and phylogenetic group analysis, as well as antibiotic susceptibility testing to 22 antibiotics/9 classes, using the Kirby-Bauer disc diffusion method. **Results:** *E. coli* were detected in all environments. Most of the isolates belong to phylogenetic groups D1 (24%, non-human mammals), and B1 (20%, birds), indicating animals as primary contaminants sources. Among *E. coli* isolates, 35% (96/272) were diarrheagenic *E. coli* (DEC). Enterotoxigenic (34%, 33/96) and enterohemorrhagic (26%, 25/96) *E. coli* were the most prevalent pathotypes detected. A total of 72% (195/272) of the isolates showed multidrug resistance to at least 3 antibiotic classes. Amid DEC isolates, 75% (72/96) presented multidrug resistance. Isolates from the phylogenetic subgroups A₁ (human and non-human mammals) and B1 showed highest virulence and multidrug resistance. **Conclusions:** This inclusive analysis underlines the need for continuous monitoring, source tracking, and effective management strategies to mitigate *E. coli* contamination. The presence of DEC and multidrug-resistant isolates aggravates the public health concern. A One Health approach, encompassing a human, animal, and environmental holistic health perspective is crucial for ensuring the safety of recreational waters.

Keywords: *Escherichia Coli*, Phylogenetic Group, Antibiotic Resistance, Recreational Water, One Health.

Acknowledgments

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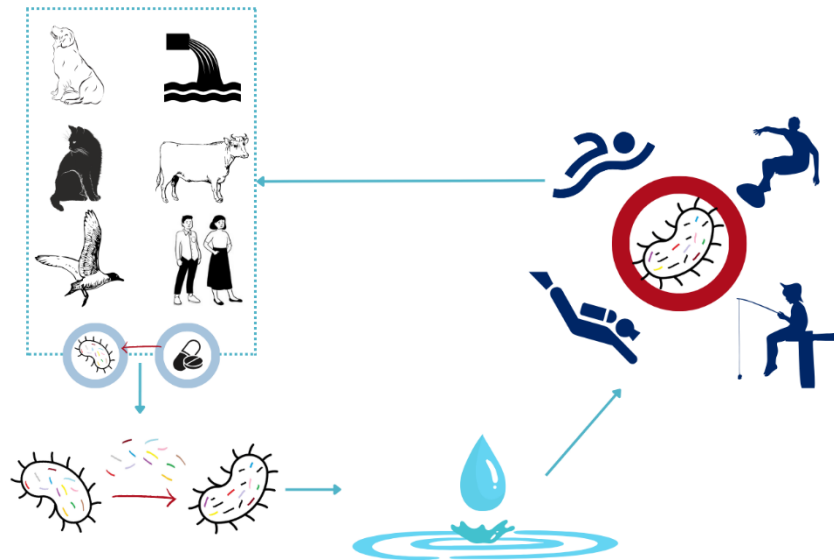


Figure 1: Circulation of *E. coli* in the environment (reservoirs, exposure routes and transmission pathways).

21407 | Ecological evaluation of Leça river: macrolitter the missing link in ecological evaluations

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Background & Aim: Freshwater ecosystems are responsible for providing several ecosystem services for the entire population; however, they are threatened by human activities. Rivers have been affected by pollutant discharges and hydromorphological changes, leading to ecological damages. River ecosystems are especially affected by macrolitter (ML), being its ecological impacts poorly studied. This study aimed to classify the ecological status of the Leça river (north of Portugal) and assess the viability of the ML characterization as a new tool for ecological evaluations. **Methods:** Along the Leça river 7 sites (P1 to P7) were sampled in 2 seasons (autumn, winter). Biological (benthic macroinvertebrates), physical, and chemical elements were used to classify the ecological status of Leça river, according to Water Framework Directive guidelines. ML was quantified, categorized, and classified following the Master and Joint lists of litter and OSPAR categories in the riverbank of each site. **Results:** The ecological status of the river demonstrated a tendency to deteriorate as one moved downstream. Physical and chemical results showed that P1 was consistently classified as Good, while P4 to P7 were always classified as Moderate (due to high nutrient concentrations, e.g., P5 – 21 mg PO₄/L in autumn). Macroinvertebrate communities showed a similar trend classifying P1 with a Moderate status, P2 with a Moderate and a Poor status, P3, P4, and P5 with a Poor status, P6 with a Bad status (the lowest classification) and P7 with a Poor and a Bad status. A significant prevalence of ML was documented across all sites, encompassing a total of 970 items distributed among 72 litter categories, with plastic bags emerging as the most prevalent. P6 exhibited the highest quantity of ML (16.53 kg), aligning with the recorded lowest ecological classification. **Conclusions:** Our findings suggest that Leça River is impacted by anthropogenic activities, and ML is prevalent throughout its course, with a downstream escalation coinciding with a decline in ecological status.

Keywords: Ecological evaluation, River, Ecological status, Macrolitter.

21413 | Assessing Personal Air Exposure in Everyday Settings: A Case Study

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Background & Aim: Air pollution has been associated with negative consequences on human health. In order to implement protective strategies, estimating air pollution exposure on a personal level is a key aspect. Thus, the main objectives of this study were to assess personal exposure to gaseous pollutants, namely NO₂ and CO₂, during typical daily activities and to estimate the respective inhalation doses. **Methods:** Personal exposure to NO₂ and CO₂ was assessed during 96 h by Aeroqual Portable Air Quality Monitor (series 500, Aeroqual HQ) and IAQ-Calc™ Indoor Air Quality Meters (model 7545, TSI Inc.), respectively. All equipment was carried continuously throughout all days, on weekdays and weekends. The subject's heart rate (HR) was monitored by a chest-band heart rate sensor (model H7; Polar Electro Oy). All relevant information was recorded, both for the various environments and periods. **Results:** The highest NO₂ exposure was strongly linked with traffic emissions sources, namely while being in the car park (exposure duration t = 4 min), car ride (t = 11 min), and outdoor walking at rush hours (t = 37 min), with medians in a range of 0.024–0.052 ppm. When indoors, cooking emissions were the predominant source of NO₂ (0.017–0.020 ppm), while it was human occupancy for elevated CO₂, both in professional (classroom: median of 2104 ppm; library: 1479 ppm) and public spaces (church: 1459 ppm). Personal time patterns (52–80% spent at home) and the activity performed (39–43% total daily time with HR of ≤ 75 beats min⁻¹; 2–7% with HR ≥ 101 beats min⁻¹) were crucial for total inhalation dose (NO₂: 7.54–9.55 μg kg⁻¹; CO₂: 640774–789896 μg kg⁻¹). The highest daily dose for NO₂ and CO₂ occurred in the bedroom during long (9.5–10.5 h) yet low-intense activities, with NO₂ dose of 2.52 μg kg⁻¹ (29% of total) and CO₂ of 336083 μg kg⁻¹ (52% of total). **Conclusions:** Personal exposure monitoring provides detailed insight, but its challenges may outweigh the positive benefits, especially for large population studies.

Keywords: Air Quality, Gaseous Pollutants, Personal Exposure, Indoor/ Outdoor, Dose.

Acknowledgments

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Development

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Background & Aim: As people spend approximately one-third of their lives sleeping, ensuring suitable indoor air quality (IAQ) in bedrooms is essential for their health and well-being. Despite its importance, a comprehensive understanding of IAQ during sleep is still scarce. Thus, the main objective of this study was to assess the sleep quality among Portuguese adult population and to evaluate IAQ exposure levels during sleep. **Methods:** IAQ sampling was conducted at three homes (H1-H3) situated in Oporto Metropolitan Area. Levels of CO₂, CO, TVOCs were continuously (48-100 h) monitored in bedrooms with IAQ-Calc™ Indoor Air Quality Meters (model 7545, TSI Inc.) and VelociCalc® Multi-Function Ventilation (model 9565, TSI Inc.). Subject characterizations (n=3) were done using the Pittsburgh Sleep Quality Index, a self-assessed Portuguese form and diaries (evening and morning sleep). Subject's heart rate was registered by a wrist-worn active tracker (Fitbit, model Charge 5). **Results:** CO₂ levels fulfilled the protective threshold of 1250 ppm at all H1-H3 (median CO₂: 622 ppm; range: 561–688 ppm), most likely due to the occupant's activities. CO₂ concentrations were higher during nights, likely attributed to the occupants' presence in the bedrooms. Finally, observed CO and TVOCs were well below the established legislative thresholds. Average sleep duration (423 min) and three parameters indicating sleep quality, namely number of awakenings > 5 min (1), sleep efficiency (86 %), and REM sleep abundance (26 %), were within the appropriate ranges recommended by the American National Sleep Foundation. On the contrary, sleep latency (31 min) and heavy sleep proportion (21 %) surpassed the recommended values. Finally, the results of the medical scales showed that 1/3 of study participants had disturbed quality of sleep. **Conclusions:** Maintaining good IAQ and its management is essential for creating a sleep conducive environment and promoting the well-being of individuals and society in general.

Keywords: Indoor Air Quality, Sleep Quality, Gaseous Pollutants, Homes, Legislation.

Acknowledgments

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21449 | Methallothionein-encoding genes are differentially regulated in different organs of *Arabidopsis thaliana* by exposure to high Ni levels

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Background & Aim: Environmental pollution has increased the concentration of heavy metals (HM) in the environment, leading to the development of strategies to prevent their impact on the ecosystems and humans. Metallothioneins (MT) are small Cys-rich proteins with low molecular mass, responsible for the detoxification of HM in cells. These proteins can chelate HM, regulate cellular homeostasis and the detoxification process, preventing HM from interfering with cell functioning. *Arabidopsis thaliana* expresses 8 MT-encoding genes (MT1A, MT1B, MT1C, MT2A, MT2B, MT3, MT4A, MT4B) but there is still not much knowledge regarding their individual response to some HM. Thus, the response of the MT multigene family to the exposure to high levels of Ni in wild *A. thaliana* was studied. **Methods:** Seeds of *A. thaliana* were placed in MS medium with increasing concentrations of Ni – 2.5 mg/L; 5 mg/L; 7.5 mg/L; 10 mg/L. After 21 days of exposure, the expression of the *AtMTs* genes was analysed by RT-qPCR in roots and mature leaves. **Results:** The 8 genes reacted differentially to the varying concentrations of Ni and in an organ-specific way. The expression of MT1A in mature leaves had a significant reduction in the two highest concentrations by 75.28% and 71.77%, respectively. Both MT2A and MT2B had a significant decrease in their expression with 7.5 mg/L, 82.81% and 81.26%, respectively, but only MT2A had a significant reduction in the highest concentration of Ni of 65.29%. In the roots the expression of the MT1A gene showed significant increases of 264.3%, 206.9%, 378.2%, 421.4%, from the lowest to the highest concentration of Ni. MT1C also significantly increased its expression when exposed to Ni by 673%, 419.7%, 700.4% and 342.5%, respectively. However, MT3 only had a significant increase with the lowest concentration. **Conclusions:** These results imply that the increased expression of MT1A, MT1C and MT3 in roots is of great importance for reducing Ni toxicity in shoots by retaining it in the roots.

Keywords: Gene Expression, Oxidative Stress, RT-qPCR, Heavy Metal Contamination.

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21472 | Development of a novel system to evaluate removal of synthetic musk's from surface waters

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Background & Aim: Water contamination is a global concern affecting public health and the environment. Synthetic musk's (SMs), commonly found in personal care products (PCPs), pose emerging risks as they enter water bodies. Our project aims to address this issue by developing an innovative water filtration system designed to remove SMs. The primary component is a cellulose membrane known for biodegradability, impregnated with Deep Eutectic Solvents (DES) for enhanced efficiency. **Methods:** To achieve the project's goals, we designed a practical system for assessing membrane efficiency under conditions mimicking river ecosystems and factors influencing contaminant adsorption (Fig 1). The system design comprehensively addresses managerial, organizational, and component specifications. Information requirements guide the entire system-building process, coupled with minimizing end-user involvement. Special emphasis was placed on the programming stage. The test of the device was done concerning the suitability of the unit and robustness; the developed software was also evaluated in the boundaries of the limits of the variables. **Results:** Results indicate the device efficiently evaluates membrane performance. The incorporation of DES in membranes was achieved with success, different type of DES have been evaluated in order to investigate their stability and efficiency in the removal of the selected SMs. This setup allows precise experiments to evaluate the membrane's adsorption efficiency in eliminating SMs. **Conclusions:** Our study presents a cost-effective strategy to enhance PCP removal from wastewater. The designed device replicates real wastewater treatment plant conditions, utilizing a DES-impregnated membrane for selective removal of galaxolide and tonalide. The membrane's promising efficiency and stability in real conditions make it a valuable solution for addressing water contamination challenges.

Keywords: Membrane, Musk's, DES, Health, Environment.

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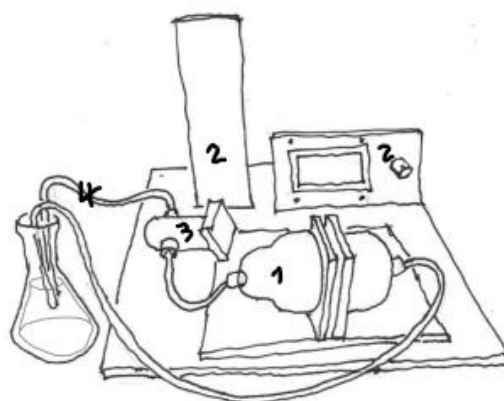


Figure 1: Device to evaluate the efficiency of the cellulose membrane. 1-Test chamber; 2-Digital controller; 3-Pulse pump; 4 Connecting tubes.

21473 | Influence of different concentrations of nickel in the phytochelatin synthase

1 gene expression in *Arabidopsis thaliana*

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Background & Aim: To combat the stress caused by increased concentrations of heavy metals (HM) in the soil, such as Ni, plants, by evolution, acquired HM chelation systems that use several ligands to decrease HM toxicity. Phytochelatins are a family of cysteine-rich peptides synthesized from reduced glutathione (GSH) by phytochelatin synthase (PCS; EC. 2.3.2.15) that bind to HM. *Arabidopsis thaliana* has two types of PCS: PCS1 and PCS2; PCS1 being the most active at the whole plant level. This work aimed to study *AtPCS1* expression in different parts of the plant when subjected to increasing Ni concentrations. Hydrogen peroxide (H₂O₂), GSH, and photosynthetic pigments (PP) were also studied to evaluate the stress imposed by the exposure to Ni. **Methods:** Wild-type *A. thaliana* were grown during 21 days after germination in medium supplemented with increasing Ni concentrations – 0, 2.5, 5, 7.5 and 10 mg/L. Total RNA from young leaves (YL), mature leaves (ML) and roots (R) was used to perform RT-qPCR analysis. The biochemical parameters GSH and H₂O₂ were determined in R and in the aerial part (AP) of the plants, while for PP the YL and ML were used. **Results:** *AtPCS1* expression significantly decreased in YL and ML with the increasing Ni concentrations, but no changes were detected in R. Considering AP GSH and H₂O₂ levels, a significant decrease for both compounds with all Ni concentrations was detected, but in R GSH significantly increased only with 10 mg/L, while H₂O₂ only increased with 2.5 and 10 mg/L. No significant results were noted for PP. **Conclusions:** Ni stress had an inhibitory effect in *AtPCS1* expression in YL and ML, suggesting that other HM-chelating strategies were activated to protect these organs from this HM. The changes observed in GSH and H₂O₂ in the AP and in R as a response to Ni indicate that oxidative stress occurred only in R, with GSH being increased in this organ to possibly act as a chelating mechanism.

Keywords: Heavy Metals, Ni, *Atpcs1*, RT-Qpcr.

Acknowledgments

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21583 | Are environmentally-aged microplastics harmful to the health of the Mediterranean mussel (*Mytilus galloprovincialis*)?

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Background & Aim: The occurrence of microplastics (MPs) in aquatic ecosystems has become a topic of growing interest in recent years. Marine filter feeders are particularly susceptible to ingest suspended MPs, but our understanding of the potential effects of this uptake under realistic environmental conditions remains limited. Inconsistencies in the ability of laboratory-grade microbeads to represent real MP in the environment in terms of material composition, morphology and charge, may lead to an underestimation of the true extent of MP hazard and risk. **Methods:** In this study, we used mussels (*Mytilus galloprovincialis*) to investigate the potential effects of realistic MPs on physio-biochemical performance. To mimic realistic MP pollution scenarios, mussels were exposed to a cocktail of aged MPs consisting of irregular particles ranging in size from 63 to 499 μm , at two environmental concentrations (0.01 and 0.1 g/L) over an 8-day period. Biochemical responses associated with neurotoxicity, energy metabolism, oxidative stress and damage were evaluated in different tissues. Byssus production were also assessed. **Results:** Exposure to aged MPs caused neurotoxicity in the gills and adductor muscle through acetylcholinesterase (AChE) inhibition, increased LDH and ODH activities in the foot indicating alterations in cellular energy production, and increased of gills LPO levels indicating oxidative damage. Furthermore, the exposure to aged MPs also resulted in a significant reduction in byssus production. **Conclusions:** Our results suggest that exposure to aged MPs could affect physiological and biochemical parameters in Mediterranean mussels. This underscores the need to assess the environmental hazard posed by MPs under realistic scenarios.

Keywords: Bivalves, Marine Litter, Biomarkers.

Acknowledgments

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21595 | Assessment of the effects of iron in *Arabidopsis thaliana*'s oxidative status

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Background and Aim: Nowadays, environmental pollution is one of leading causes for the increasing contamination of crop soils. Heavy metals (HM) are amongst these contaminants and are known for their negative impacts on living organisms, such as plants, when present in large concentrations. Iron (Fe), despite being an essential micronutrient, can induce stress in plants when in large amounts. In this study we aimed to evaluate the effects of increasing concentrations of Iron (Fe^{2+}) in shoots (S) and roots (R) of *Arabidopsis thaliana* regarding oxidative damage. **Methods:** Wild type *A. thaliana* were grown for 21 days after germination in petri dishes with Murashige and Skoog (MS) medium supplemented with increasing Fe^{2+} concentrations – 0 mg/L, 3 mg/L, 6mg/L and 12,5 mg/L. For both R and S, 150-200 mg of fresh weight samples were collected and used for the biochemical quantification of lipid peroxidation (expressed as malondialdehyde (MDA) levels), and of H_2O_2 , to assess cellular damage and the level of the oxidative stress, respectively. **Results:** *A. thaliana* shoots suffered an increase of 1,38x in MDA concentration when exposed to the highest concentration of Fe^{2+} (12,5 mg/L), only. No significant results were observed in R for this concentration. An increase in H_2O_2 levels was detected in S (1,41x), while in R this ROS decreased (1,52x) with this same concentration of Fe^{2+} . No differences were detected for both organs with the other Fe^{2+} concentrations supplied. **Conclusions:** The aerial parts of *A. thaliana* plants revealed to be more susceptible than R to Fe^{2+} only at the highest concentration used since, when exposed to 12,5 mg/L of Fe^{2+} , a significant increase of cellular damage occurred that correlated with the increase of ROS detected in S. On the other hand, the decrease of H_2O_2 levels in the R, with the highest concentration of Fe^{2+} , may be the result of HM-chelating- or antioxidant mechanisms that protected the R from oxidative stress caused by this HM.

Keywords: Heavy Metals, Fe^{2+} , Lipidic Peroxidation, ROS Activity.

Acknowledgments

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21619 | Microplastics in our fish favourites: are we consuming it?

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Background & Aim: Microplastics (MPs) are increasingly recognized as being widespread in the world's oceans. However, there remains a significant gap in our understanding of human exposure to these particles, as comprehensive data in this regard remains limited. The aims of this study were to investigate MP contamination in the dorsal muscle of four commonly consumed fish species (*Trisopterus luscus*, *Merluccius merluccius*, *Sardina pilchardus* and *Micromesistius poutassou*) and to estimate the human risk of MP intake (HRI) through the consumption of fish (edible portion). **Methods:** The fish specimens were purchased in the Matosinhos fish port. The human risk of MP intake (HRI) was estimated for both adults and children, based on the recommendation of the European Food Safety Authority (EFSA) of fish consumption. **Results:** The mean (\pm SD) number of MPs detected per gram of dorsal muscle tissue was as follows: 0.18 ± 0.23 items/g for *T. luscus*, 0.11 ± 0.11 items/g for *M. merluccius* and 0.08 ± 0.10 items/g for *M. poutassou*. No MPs were found in any muscle tissue samples from *S. pilchardus*. HRI varied widely, from 0 MPs/year to 2796 MPs/year, depending on the species consumed and the age group. **Conclusions:** Additional data on MPs in marine products commonly consumed by people are needed to more accurately estimate human MP exposure.

Keywords: Marine Fish, Marine Litter, Seafood.

Acknowledgments

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21670 | Photocatalytic removal of organic pollutants from wastewaters using TiO₂-Carbon Dots nanocomposites

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Background & Aim: Water is one of the most important resources on Earth. However, due to contamination by organic pollutants, the supply of drinkable water is dwindling. Current water treatment technologies are incapable of efficiently removing organic pollutants. [1] One possible alternative would be the use of advanced oxidation processes. Photocatalysts, like TiO₂ have several advantages, such as employing an inexhaustible energy source (solar irradiation) and achieving near complete pollutant degradation. [1,2] Nevertheless, TiO₂ also has some limitations, such as poor sunlight harvesting ability and low photonic efficiency. [1] To address these limitations, we have conjugated TiO₂ with carbon dots (CDs), which are carbon-based nanoparticles that present several interesting properties, chief among which are a broadband absorption range and the capacity of acting as an electron reservoir. [1,2,3] **Methods:** CDs were prepared from citric acid, ethylenediamine and corn stover via hydrothermal treatment. Nanocomposites were prepared via mixing of CDs and TiO₂. Photocatalytic assays were conducted under visible light irradiation and evaluated via UV-vis spectroscopy and HPLC. **Results:** We have synthesized a photocatalytic nanocomposite presenting potential for the photodegradation of organic pollutants. Thus far, preliminary works already confirmed its effectiveness regarding organic textile dyes. Studies concerning additional organic pollutants, such as pharmaceuticals, are currently underway. Scavenger studies and material characterization are being conducted to gain insight regarding the photocatalytic mechanism. **Conclusions:** The addition of CDs to TiO₂ appears to bridge the semiconductor's limitations and enhance the catalytic performance. By incorporating corn stover as a co-carbon precursor, we are increasing the value of an otherwise unutilised organic waste, thus promoting a circular economy, and improving the sustainability of the process.

Keywords: Photocatalysis, Water Treatment, Antibiotics, Carbon Dots, TiO₂.

Acknowledgments

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21923 | Taxonomic and Functional Responses of Deep-Sea Microbial Communities to Cadmium Exposure

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Background and Aim: Metal-rich nodules in the deep ocean contain significant quantities of high-value metals such as copper, nickel, and cobalt. Mining deep-sea minerals is considered as an alternative to land mining, to reduce environmental effects and gain geopolitical advantages. However, this action may expose deep-sea microbes to toxic concentrations of metals such as cadmium (Cd) which shown to have an impact on metabolic and biogeochemical processes. These microbes contribute to genetic diversity and N-cycle processes and still the possible impacts from metal exposure to those communities are not well understood. The study aims to evaluate deep-sea microbial diversity, analyze its genomic responses to varied degrees of Cd exposure, and quantify the abundance and expression of N-cycle genes. **Methods:** Sediment samples from Pacific Ocean seamounts were collected, 96h pre-exposed to different concentrations of Cd, and later sequenced with 16S rRNA gene sequencing with Illumina MiSeq. Bioinformatics analysis has been conducted to investigate the taxonomic and functional diversity of microbial communities as well as their genomic responses to metal exposure. RT-qPCR has also been performed to observe the expression of genes involved in the N cycle and evaluate their response to Cd exposure. **Results:** Upon completion of the study, we expect a shift in the diversity of microbes found in sediment samples as Cd concentrations increase. Some microbes may be more resistant to Cd and become more abundant, whilst others may become less abundant. Furthermore, we anticipate a change in the relative expression of nirK and nosZ gene expression with increasing exposure to Cd concentration. **Conclusion:** Deep-sea mining is expected to have impacts on the microbial communities, possibly hampering the diversity of the communities and disturbing the N-cycle. Future research should investigate the other aspects of the impacts that can come along with deep-sea mining before the approval of commercial operation.

Keywords: Deep-sea mining, Microbial diversity, N cycle, Cadmium.

21999 | Are anthropogenic marine micro-debris contributing to pollution-induced neurotoxicity in marine fish populations?

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Background & Aim: The presence of anthropogenic marine micro-debris (MMDs) in the ocean is a global-scale paradigm of difficult solution. Laboratory studies demonstrated that MMDs, can cross the blood-brain barrier of fish and cause neurotoxicity through inhibition of the acetylcholinesterase (AChE) enzyme. However, data on the potential MMDs-induced neurotoxicity in wild populations of fish is still very limited. Therefore, this study aimed to investigate the potential presence of MMDs in the brain of wild fish in relation to brain AChE activity in a real scenario. **Methods:** A total of 50 specimens of the European hake (*Merluccius merluccius*) were taken from the commercial fishing fleet shortly after landing in the Matosinhos and brought to the laboratory for analysis in thermally insulated boxes under cold conditions. The whole brain of each fish was isolated and divided into two parts. The cerebellum was isolated and prepared for the determination of AChE activity and the remaining brain regions were combined for MMDs analyses. **Results:** Of the sampled fish, 15 (30%) had MMDs in the brain. The MMDs observed varied in size (43-3356 μm) and were of two shapes (fibres and fragments). The mean ($\pm\text{SD}$) of AChE activity was lower (46 ± 16 nmol/min/mg protein) in fish with MMDs in the brain than in fish where MMDs were not found in the analysed samples (58 ± 18 nmol/min/mg protein). **Conclusions:** Brain AChE inhibition in fish with MMDs points to neurotoxicity induced by long-term exposure to MMDs, chemicals linked to MMDs or both.

Keywords: Marine Debris, Brain, Neurotoxicity, Wild Fish.

Acknowledgments

This study was carried out in the scope of the projects: μ -PLASTICS funded by FCT (2020.02573.CEECIND/CP1599/CT0006); and RESPONSE, JPI – Oceans – 2nd call on microplastics, CIIMAR component funded by FCT (FCT/MCTES, MICROPLAST/0006/2018).

22085 | Sustainable Valorization of Chestnut Processing Waste: Development of Functional and Biodegradable Films

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Background & Aim: The chestnut processing industry generates by-products, including fruits with low commercial value, shells, and burs [1,2]. Starch is one of the components of chestnut fruits [3]. The objectives of this study were: to enhance the value of chestnut residues by developing a film reinforced with chestnut starch and shell fibers; and create and evaluate potato starch-based films (with chestnut shell extracts or with chestnut bur extracts). **Methods:** For the 1st goal, starch extraction methods (High Shear with deionized water (Sdw), High Shear with tap water (Stw), and sodium bisulfite extraction (Ssm)) were used. The resulting starches were used to prepare films, incorporating a filmogenic solution containing starch, glycerol, and fibers from chestnut shells [5]. A control film was prepared with commercial potato starch. Films were evaluated for mechanical, optical, and functional properties. For the 2nd aim, ultrasound (for shells) and pressurized water (for burs) were used to produce extracts. **Results:** Yield percentages for Sdw, Stw, and Ssm were 26.67%, 25.71%, and 24.75%, respectively. Films exhibited a properties range: elongation (4.32%-9.64%), tensile strength (1.25-2.08), and elastic modulus (13.90-40.06 N/mm²). Ultrasound resulted in higher total phenolic content (TPC) for shells (27.3 ± 1.8 mg GAeq/g), while pressurized water was more efficient for burs (25.1 ± 0.6 mg GAeq/g). The extracts were incorporated into films with potato starch. The antioxidant activity increases with extract addition. The incorporation of extracts enhanced the film's ability to absorb moisture, and UV-visible light barrier. Elongation improved with shell extracts but decreased with burr extracts, resulting in decreased tensile strength. The films exhibited thermal stability below 250 °C. **Conclusion:** In summary, both studies showcase the possibility of employing green extraction methods on chestnut residues to develop sustainable materials with enhanced properties.

Keywords: Biodegradable Films, Chestnut Starch, Chestnut Shells, Chestnut Burs, Enhanced Properties.

Acknowledgments

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22087 | Sustainability of Agricultural Production: A comparative analysis of data from Brazil, China, the United States and India from 2000 to 2020

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Background & Aim: Sustainability in the agricultural sector of developing countries has become a growing concern worldwide. The FAO report (State of the World Forests 2022) indicates that extensive agriculture is the main cause of forest deforestation at a global level. In this sense, increasing the efficiency of agricultural production is essential in order to reduce its environmental impact [1]. Similarly, [2] state that reducing agricultural carbon emissions is necessary to achieve green and sustainable agricultural growth. **Methods:** This paper presents an analysis of the sustainability of agricultural production in the world's five largest producers: China, India, the United States, Brazil and Russia, using quantitative data analysis methods for agricultural production, cultivated area (ha) and CO^{2eq} emissions) over 20 years. The analysis makes it possible to classify countries according to their level of productive sustainability, by evaluating the relationship between CO^{2eq} emissions and agricultural production, agricultural productivity gains with reduced land use, and testing the hypothesis of the Kuznets Environmental Curve for agriculture. **Results:** The methodology demonstrated that Brazil has the highest productivity rate per hectare [1] and the best carbon intensity indexes for production [2] and cultivated area [3], standing out in terms of green development in agriculture. In the analysis of the Environmental Kuznets Curve for agriculture, an inverted U-shaped relationship was observed for data from Brazil [4], but the hypothesis was not confirmed when considering data from all five countries together. **Conclusions:** Fighting hunger and providing food security through sustainable agricultural production is a reality in some countries, that's important for the development and economic growth. This study shows that Brazil has the best sustainability indexes evaluated, which indicates that the country can be an international benchmark in sustainable agricultural practices.

Keywords: Sustainability, Ambiental, Agriculture.

Acknowledgments

Curva Ambiental de Kuznetz

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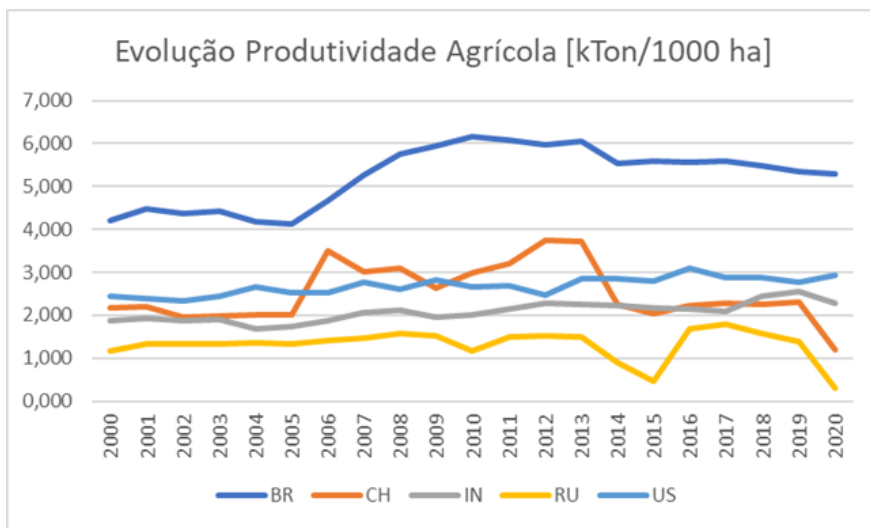


Figure 1: Evolution of Agricultural Productivity

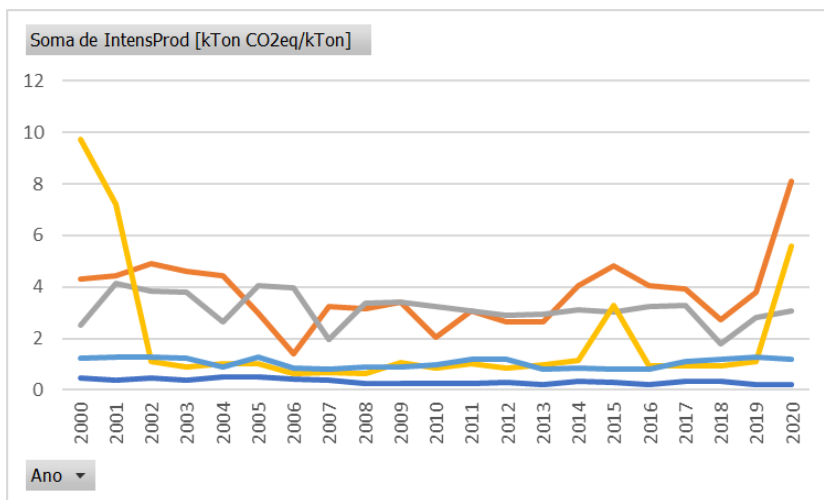


Figure 2: Carbon Intensity Evolution of Agricultural Productivity

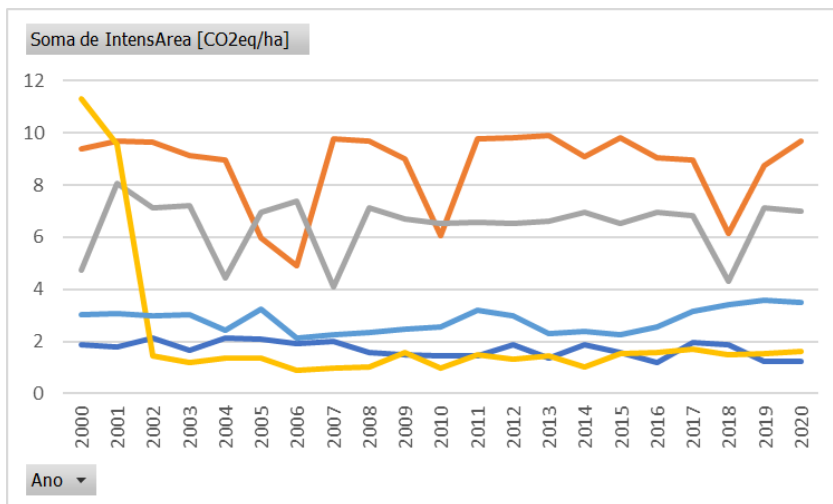


Figure 3: Carbon Intensity Evolution of Agricultural Area

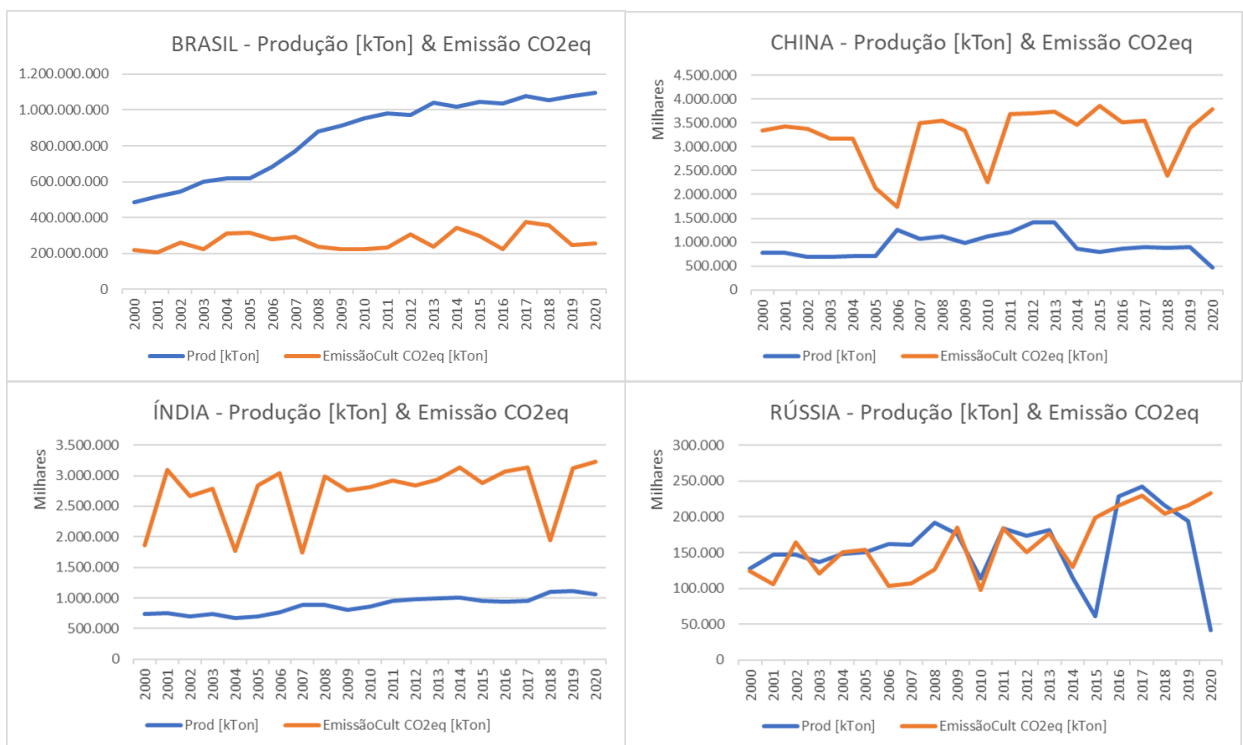


Figure 4: Individual Analysis – Agriculture Productivity versus CO2 emissions. (a)Brazil (b) China. (c) India (d) Russia and (e) The United States



GEOGRAPHY, PHILOSOPHY AND SOCIOLOGY

JUP
17.^a EDIÇÃO

21440 | Towards storytelling in map-making: a geo-historical contribution

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Background & Aim: The role of cartography as a vehicle of communication is well understood [1]; nevertheless, the advent of digital driven map-making has allowed for an expansion of inquiries, results, and users [2]. Cartography is now also a tool for major news agencies, digital communicators, and data analysts in multinational companies; it is a storytelling tool for non-academic users [3]. We intend to promote a conversation about cartography as a storytelling device, with the intent of detailing the process of map-making for (future) journalists, analysts, and others. **Methods:** Based on a detailed literary review (from different cultural worldviews) and personal experience we offer a set of guidelines, both theoretical and methodological, to guide the map-making process following a geo-historical perspective. This shall be accomplished by a great array of examples (emerging from different authors, techniques, software, world perspectives, spaces, and times), as well as problem-based inquiries linked to these same examples. **Results:** (a) To promote a conversation about map making; (b) to offer guidelines to help others to utilize cartography as a storytelling device; (c) to further the use of cartography with a sensibility to semiotic concerns; and (d) to observe and adjust our set of guidelines following the feedback we receive from the conversation about storytelling in a geohistorical approach. **Conclusions:** This work complements the ongoing developments done by fellow researchers in other circuits and introduces a detailed analysis of cartography as a means of storytelling, driven by a geohistorical approach. It also serves as one more demonstration of the impact of the digital realm in expanding the possibilities for transdisciplinary activities.

Keywords: Storytelling, Cartography, Geo-historical maps, Map-making.

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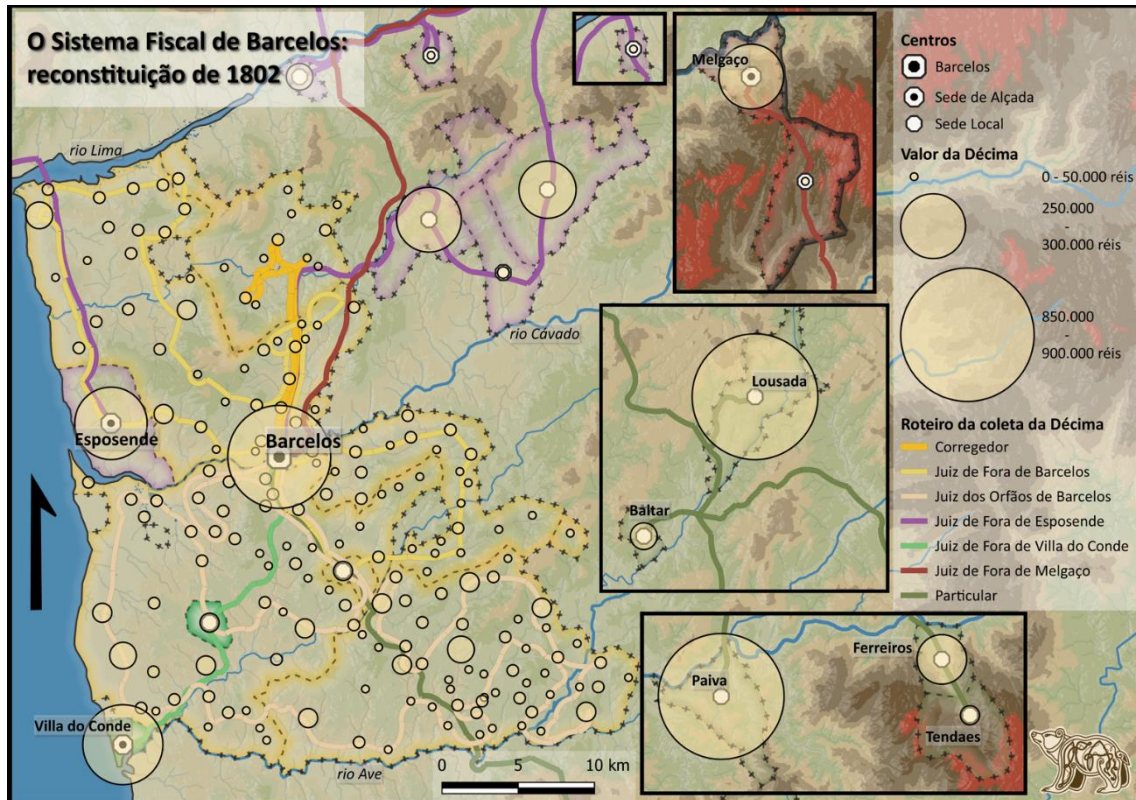


Figure 1: Example of a narrative-driven map [The fiscal system of Barcelos: reconstitution of 1802, in Portuguese, authorial, @Bernardo CAS, 2024.]

21446 | The Social Impact of the COVID-19 Pandemic on Portuguese Philharmonic

Bands

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Background & Aim: Cultural associations, essential in Portuguese society [1;2], faced several impacts due to the COVID-19 pandemic. The Philharmonic Bands experienced a complete halt from March 2020, resuming in a limited capacity only in the second half of 2021. This led to serious social issues, as the associations were prevented from carrying out any activity, causing disinterest among some musicians to return after almost two years of interruption. This unprecedented study aims to understand the social impacts that the COVID-19 pandemic caused on Portuguese Philharmonic Bands. **Methods:** To achieve the proposed objective, a questionnaire was developed for all philharmonic bands in Portugal (Continental and Insular), obtaining 350 responses from Association Leaders, Artistic Directors (Conductors), and Musicians from more than 200 associations. Thus, gaining a comprehensive and in-depth understanding of the actual situation of philharmonic bands in Portugal after the pandemic was possible. **Results:** The results show that the COVID-19 pandemic had significant impacts on Portuguese philharmonic bands, particularly in terms of sociability, with some cases observing a high number of associations struggling with human resources issues, recognizing that the stoppage caused by the pandemic resulted in the breakdown of ties between musicians and the institutions. **Conclusions:** Within the scope of public policies for the cultural sector, it is crucial to support the philharmonic bands, often the only cultural and social strut in more remote locations of Portugal, contributing significantly to the dynamism of communities. Recognition and support from municipalities are fundamental, with the creation of financial support lines and community involvement essential to ensure the survival of these institutions, but integrating philharmonic bands into cultural governmental strategies is imperative to ensure their survival and foster cultural vibrancy in even the most remote areas of Portugal.

Keywords: The Covid-19 Pandemic, Social Impact, Philharmonic Bands, Portugal.

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We sincerely thank the bands for responding, making a valuable contribution to our study.

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21825 | Bibliometric analysis of studies on tourism and thermal comfort in the city of Porto (Portugal)

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Background & Aim: Porto is classified as type Csb for Köppen-Geiger and this means that the city has a temperate climate with dry, mild summers, but intense humidity during the winter. Due to the disparity in weather rhythms, it is necessary to gain a better understanding of how tourists relate to thermal comfort. However, because the lack of climatological data and know-how in southern European countries [1], there is a certain impact on public authorities' decisions regarding urban design [2]. **Methods:** This text looks at how the bibliography of recent research is related, using the Scopus platform to survey the articles. A total of 196 articles (figure 1) were analyzed using the indicators "thermal comfort" and "tourism". Later, using bibliometrics [3], some graphs were generated to better understand how the academic scene is organized. **Results:** The figure 2 shows the ten authors who have published the most in the last twenty years, with almost half of the works presented referring to Professor Dr. Matzarakis, from the Freiburg University. About the university's data, in tenth place is the University of Lisbon and in eleventh place the University of Barcelona (figure 3) and it is known that this placement is because the research is located in different institutions and, therefore, in figure 4, Spain stands out, although still behind Germany, China and Iran. In the general Portuguese panorama, five studies were found, two of them relating to Porto regarding methodological [4] processes and another on thermal comfort applied directly to tourists [5]. **Conclusions:** Consequently, to adopt strategies for tourism and planning in Porto, it is worth investing in research into the climate preferences of different tourist segment to show if climate extremes affect thermal comfort and the stakeholders' strategies for adapting tourism practices. It is essential to be researched for application in local tourism planning in the face of climate change for adaptation and as a brand for Porto's tourism product.

Keywords: Thermal Comfort, Tourism, Weather, Geography, Bibliometrics.

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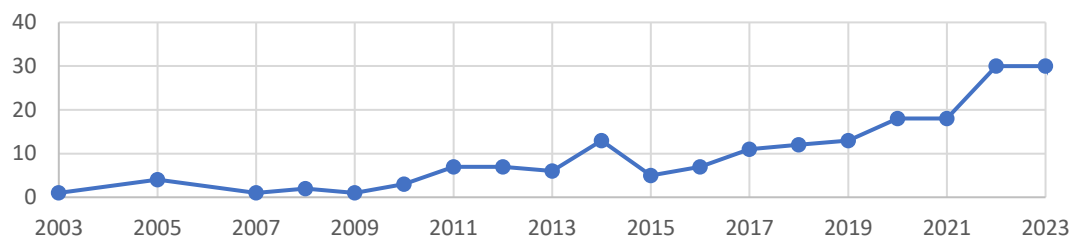


Figure 1: Publication per Year

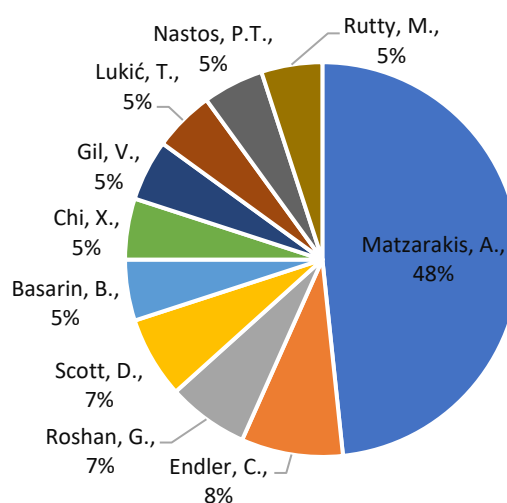


Figure 2: Publication per Autor

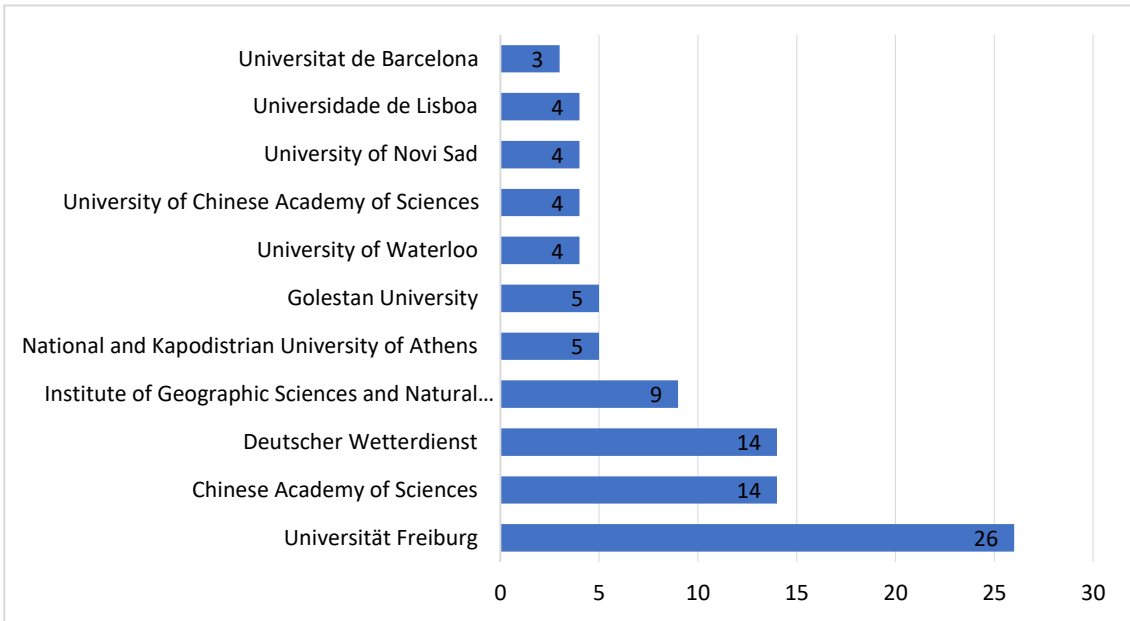


Figure 3: Publication per Filiation

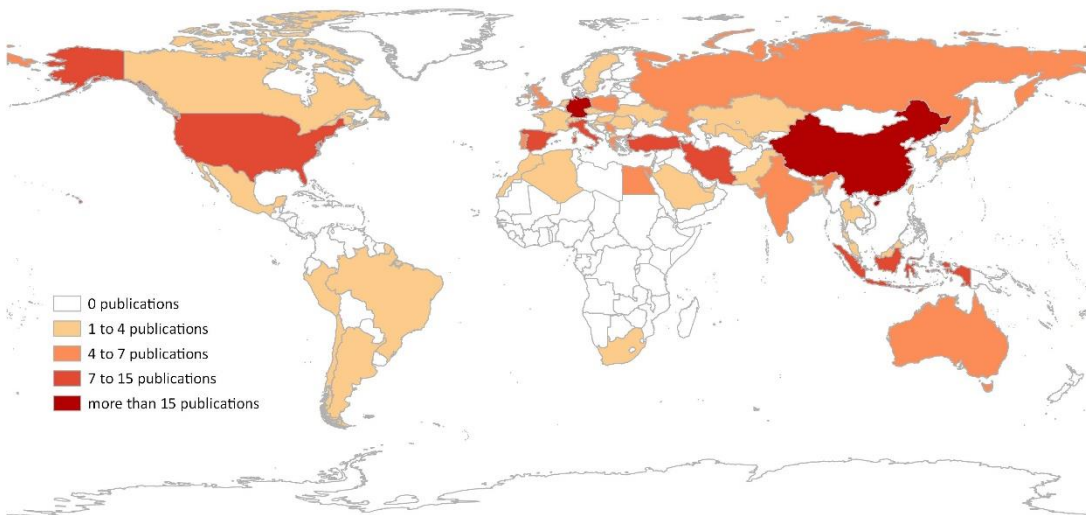


Figure 4: Publication per Country

21359 | Independent journalism: a credibility problem?

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Background & Aim: The authors Beers (2006) and Lacerda (2016) state that independent media face challenges in reaching audiences and establishing trust when compared to mainstream media. The present academic research aims to show that independent journalism is increasingly asserting itself as credible, and capable of creating a close relationship with the public in a way we do not find in mainstream journalism. **Methods:** This academic research explores why independent journalism is as credible as mainstream media in 5 categories: [1] literature that shows the beginning of independent journalism, [2] literature that points out characteristics that distinguish independent journalism from mainstream journalism, as well as what both have in common, [3] research that shows independent journalist in the service of democracy, [4] professional credibility [5] awards won both by independent and mainstream media. **Results:** Independent media and mainstream media come with different organizational dynamics, but the principle of serving society is present in both. **Conclusions:** At the end, the result is the same: truth, trustworthy information, and public service.

Keywords: Journalism, Independent Media, Mainstream Media, Media Credibility.

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21588 | From the “Despisers of the Body” to the exaltation of the Body in contemporaneity

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At the end of the 19th century Nietzsche, in his work "Thus Spoke Zarathustra", dedicates a chapter to the "Despisers of the Body", in which he criticizes the way different thinkers throughout the history of philosophy have sidelined and denigrated the Body - the senses, passions, desires - in favor of pure reason and all the Christian precepts. Nietzsche argues that it is fundamental to rethink the Body and rescue it from the contempt it has been subjected to. According to the author, it is necessary to place the Body as a central and essential element for a new philosophy. Today, we witness the emergence of an increasingly pervasive cult of the body, and a superficial approach might suggest that the Body has finally attained the central place advocated by Nietzsche. However, a deeper analysis reveals that the Body has been praised as an object of consumption. This entails that the Body is valued solely to be reduced to a commodity. Consequently, we observe an elevation of the body, in which it is emptied of meaning and reduced to its superficial image. The Body loses its dignity and uniqueness, thus being treated as a mere consumer product, disposable and artificial. Contemporaneity perpetuates the "Despisers of the Body" mentioned by Nietzsche, albeit in a disguised manner. This essay seeks to reflect on Nietzsche's thought regarding the body as "will to power" and as a path to achieve the "over-human," contrasting it with the way in which the body has been appropriated and commodified by contemporary consumerism.

Keywords: Nietzsche, Body, Consumerism, Over-Human,

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21867 | Poetry and teaching of philosophy: a perspective for high school education

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Background & Aim: The present investigation aims to consider poetry as a didactic resource in high school philosophy class. **Methods:** In the first place, we will consider what is intrinsic to poetry, what poetry is. Poetry is viewed as an art form that uses words to say the unspeakable (*indizível*). More precisely poetry makes it possible to see/feel the *objective enigmaticity of the world* or the *obscure domain of reality*. That occurs due to of the unusual use of words within the poems. (Dias,2014). After reflecting on this, we explore the key components of high school philosophy classes: *awareness (sensibilização)*, *problematization*, *investigation*, and *conceptualization*. *Awareness* is the initial phase where the goal is to motivate students and capture their attention regarding the topic of the class, which will then undergo philosophical treatment. *Problematization* aims to "transform the theme into a problem" (Gallo, 2012) and create the desire to find solutions to the raised problem. During the *investigation phase* philosophical texts are read, offering different ways to formulate answers to the previously raised problems (by offering different concepts to deal with the problems). *Conceptualization* is the time for students to solve the problem that's being faced, the will raised before to find solution must be addressed to create an answer. **Results & Conclusions:** Firstly, if the poem manages to affect the student, that is, if the student feels these obscure and enigmatic domains of reality, his attention will naturally be drawn to the theme present in the poem (*awereness*). Secondly, the poem can also be an active part in the *problematization* stage. This is because the enigma is in itself, by its nature, a challenge to rationality, generating a desire to solve it. To achieve this the teacher needs to promote the perception on students of the enigmatic nature within the poem; if the teachers accomplish this then the poem was an active part of *problematization*.

Keywords: Philosophy, Poetry, Teaching of Philosophy, *Awereness*, *Problematization*.

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21500 | Intervention art in the feminine: The case of Paula Rego's figurative art

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Art can assume a representative and relational role for communities, intervening and creating reflection in collective life, so the study of the relation of art as a social fact and the relationship between art and the economic/social context becomes pertinent. Considering the theme "female intervention art", the aim was to conduct an analysis of art as an object of questioning the organization of collective life and the symbolic representations of society, using the art of Paula Rego as a reference, based on the sociological conception of art and considering the artist's relation to the dictatorship of the Estado Novo and the position of women in society as a manifestation of the power of art. This research has both a qualitative and intensive approach – a qualitative methodological analysis which makes use of the computerization of art exhibition spaces through the analysis of websites, and an analysis of the illustrations to introduce a relational aspect between those and the theoretical framework. The data obtained corroborates the issues raised in relation to the power of art and the manifestations made by artists in their work as a way of giving voice to causes. It was possible to comprehend the diversity of the artistic universe and Rego's political and social side of art as the result of a plurality of themes and artistic techniques to understand art as an object to questioning collective life. These artworks and their interpretations should not be understood as stagnant or factual. Rego's artwork produced openness that delegates to the viewer the power to interpret, encouraging questions and thoughts about the various themes portrayed. Therefore, considering the conclusions, this report led to a reflection on its contribution to the development of other reflections on artwork of Paula Rego – providing an interesting debate about power, rights and symbolic violence with a significant impact not only on art, but on sociology itself.

Keywords: Art, Intervention, Symbolic power, Sociology of Art, Paula Rego.

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CENTRO DE ARTE MODERNA
GULBENKIAN

Paula Rego

Lisboa, Portugal, 1935 – Londres, Inglaterra, 2022

A “portuguesa de Camden Town”, como lhe chamava o poeta Alberto de Lacerda, vai estudar para Inglaterra aos 16 anos porque nas palavras do pai, Portugal «não é terra para mulheres».

Ler mais ▾



Source: Centro de Arte Moderna Gulbenkian

Figure 1: Página da artista Paula Rego no site do Centro de Arte Moderna Gulbenkian



1960
Óleo sobre tela
Inv. B3P417

PINTURA / ARTE PORTUGUESA

Paula Rego

S. Vomiting the Pátria

Victor Musgrave, fundador da emblemática Gallery One, em Londres e entusiasta da obra de Paula Rego e do que nela reconhecia de «marginal», recusou-se a expor *Salazar a Vomitar a Pátria* porque, na sua opinião, tinha «falos a mais». Em Lisboa, a Galeria de S. Mamede incluiu-a no catálogo da exposição *10 Artistas da Galeria S. Mamede*, realizada em Maio de 1972, mas omitiu o nome do ditador e substituiu «vomitar» pelo inglês «vomiting».

«Será que onsurei, disse a mim mesma, onsurei fazer a pintura de Salazar a vomitar a Pátria? Porque na realidade o que devia ser era a Pátria a vomitar Salazar. Isto até era ligeiramente simpático em relação ao ditador, o que era uma coisa extremamente perversa», recorda Paula Rego em conversa com Mareo Livingstone, comissário da exposição retrospectiva realizada no Museo Nacional Reina Sofia, Madrid, 2007.

Source: Centro de Arte Moderna Gulbenkian

Figure 2: Presentation of the work "S. Vomiting the Patria" (1960) by Paula Rego, on the website of the Gulbenkian Center for Modern Art



Source: Centro de Arte Moderna Gulbenkian

Figure 3: Painting of Paula Rego. "s/título" (pastels), 1997.

22000 | Youth Participation and Empowerment through Arts and Culture: Insights from the “Programa Escolhas” in Segregated Urban Contexts

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Background & Aim: This research project, developed as part of the master’s degree in Sociology and with the scientific guidance of Prof Lígia Ferro, aims to explore the dynamics of participation and empowerment of young people in segregated urban contexts, focusing on the role of culture and the arts. It builds upon existing literature on youth participation, empowerment, and public policies, particularly the “Programa Escolhas”, a Portuguese government initiative targeting socially vulnerable youth. By employing qualitative methods anchored in ethnography, the research seeks to understand the impact of youth assemblies on empowerment and participation, the role of the “Project Escolhas” in segregated territories, the significance of cultural mediators, and the importance of artistic activities for civic engagement. **Methods:** Qualitative methods will be used, namely ethnographic, involving participant observation, audiovisual data collection, field notes, semi-structured interviews with young people, cultural mediators and project technicians, and focus groups. Statistical data will also be used to characterize the segregated urban context. **Results:** The research hopes to provide an in-depth analysis of the “Programa Escolhas”, a qualitative view of young people's experiences, theoretical contributions, perspectives on the relationship between young people and projects and a characterization of segregated territories. **Conclusions:** This research aims to contribute to a better understanding of the dynamics of youth participation in segregated urban contexts, offering practical and theoretical perspectives. By focusing on the intersection between artistic activities, participation and empowerment, it seeks to inform similar projects and public policies, promoting inclusive environments for diverse youth populations.

Keywords: Youth Participation, Empowerment, Urban Segregation, Art-based Intervention, Cultural Mediation.



HEALTH SCIENCES

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21367 | Miscarriage is associated with higher expression of lipoxygenases: the role of lipid mediators in decidualization

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Instituto Politécnico de Viana do Castelo (IPVC), Viana do Castelo, Portugal³;
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Background & Aim: The essential transformation of endometrial stromal cells into decidual cells is termed decidualization. This process, driven by hormones, prepares the endometrium for uterine receptivity [1]. Research indicates that the onset of decidualization has a pro-inflammatory signature [2,3], though the counter-regulatory mechanisms for inflammation control remain unknown during early pregnancy. Our research aims to investigate the role of pro-resolving lipid mediators in first-trimester maternal tissue. **Methods:** the concentrations of lipoxin A4 and resolvin D1, along with their corresponding metabolic enzymes were assessed in tissues obtained from first-trimester elective (control) and sporadic miscarriage cases. This examination was conducted at both the mRNA and protein levels, and their expressions were further analyzed using immunohistochemistry techniques. Additionally, the impact of LXA4 and RvD1 on decidualization was explored in primary endometrial stromal cells, as well as in the endometrial stromal cell line St-T1b. **Results:** Although there were no differences in lipoxin A4 and resolvin D1 levels, we observed an upregulation in the protein expression of 12- and 15-lipoxygenases in tissues from sporadic abortion cases, indicating an inflammatory imbalance. Furthermore, our observations revealed the expression of lipoxygenases by decidual natural killer (dNK) cells. In both endometrial stromal cell models, exposure to lipoxin A4 and resolvin D1 resulted in a decline in the decidualization biomarkers prolactin and insulin-like growth factor binding protein 1. This decrease was accompanied by significant morphological changes, suggesting an aberrant differentiation process. **Conclusion:** Disruptions in the synthesis of lipid mediators compromise the inflammatory response, leading to an interplay with different cell types, including dNKs. Consequently, this could impact decidualization, potentially elevating the risk of pregnancy loss due to implantation failure.

Keywords: Emerging Lipid Mediators, Decidualization, Spontaneous Abortion, Lipoxin A4, Resolvin D1.

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21391 | Exploration of the anticancer effect of the combination of metformin and aspirin in colorectal cancer cell lines

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Background & Aim: Colorectal cancer (CRC) is the third most incident cancer and the second cause of death from cancer worldwide¹. Despite advances in surgical and adjuvant treatment, more than half of CRC patients develop incurable disease with the current treatment options available². Thus, it is necessary to develop new and improved CRC therapies. Drug repurposing is a strategy used to overcome the high costs and time consumption associated with research and development of new anticancer drugs³. Metformin (MET)– used in type 2 diabetes therapy – and aspirin (ASP)– drug with anti-inflammatory properties – are known to have anticancer properties⁴. The aim of this work was to investigate the effects of MET and ASP combination on CRC cells in vitro. **Methods:** We determined the effect of MET and/or ASP on cell proliferation, viability, migratory ability, anchorage-independent growth ability (colony formation) and nutrient uptake, using two human colorectal cancer cell lines (HT-29 and Caco-2). **Results:** Individually, MET and ASP possessed antiproliferative, cytotoxic, and antimigratory effects and reduced colony formation in HT-29 cells (BRAF- and PI3KCA-mutant). As for nutrient uptake, MET did not affect ³H-deoxy-D-glucose or ¹⁴C-butyrate uptake and lactate production and ASP caused only a small decrease in ¹⁴C-BT uptake. In these cells, combination of MET and ASP resulted in a tendency to an increase in the cytotoxic effect and in a potentiation of the inhibitory effect on colony formation, although no additive antiproliferative and antimigratory effects and no effect on nutrient uptake and lactate production were observed. In contrast, MET and ASP, both individually and in combination, were almost devoid of effects on Caco-2 cells (BRAF- and PI3KCA-wild type). **Conclusions:** Our results suggest that inhibition of PI3K is the common mechanism involved in the anti-CRC effect of both MET, ASP and their combination. So, we hypothesize that the combination of MET+ASP will especially benefit PI3KCA-mutant CRC cases, which have currently a poor prognostic.

Keywords: Metformin, Aspirin, HT-29, Caco-2, PI3K.

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21396 | New Avenues for Old Drugs: A Trojan Horse Strategy to “enhance” ciprofloxacin antibacterial activity

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Background & Aim: Antimicrobial resistance (AMR) is a growing global health threat that, in 2019, led to 1.27 million deaths. It is forecasted that, by 2025, if no action is taken, AMR will be the second biggest cause of mortality worldwide [1]. Within this emergence, discovering and developing new antibacterial drugs with novel modes of action (MoA) are crucial to tackle AMR. Bacteria metabolic processes are being explored to help in this demand, and the Trojan Horse strategy, which exploits bacteria's iron uptake pathways via the production of siderophores, is an example. This strategy consists of hijacking the bacteria iron uptake machinery through the use of antibiotic/siderophore conjugates, which can mimic the cognate ligand [2]. **Methods:** The work herein depicted is based on the design and synthesis of new ciprofloxacin-siderophore conjugates, in which iron chelator moieties were linked to ciprofloxacin, directly or through cleavable linkers. Structural elucidation of the compounds was attained by one- and two-dimensional nuclear magnetic resonance (1D and 2D NMR) techniques. The iron chelating activity was assessed using colorimetric ferrozine assay. Finally, preliminary antibacterial and toxicological screening assays were performed. **Results:** A small library of ciprofloxacin-siderophore conjugates was successfully obtained. Some conjugates exhibited relevant iron chelating and antibacterial activities and a safety toxicological profile. **Conclusions:** Two ciprofloxacin/siderophore conjugates stood out due to their antibacterial activity against Gram-positive and Gram-negative bacteria and safety toxicity window.

Keywords: Antimicrobial Resistance, Antibacterial, Ciprofloxacin, Siderophore, Iron Chelators.

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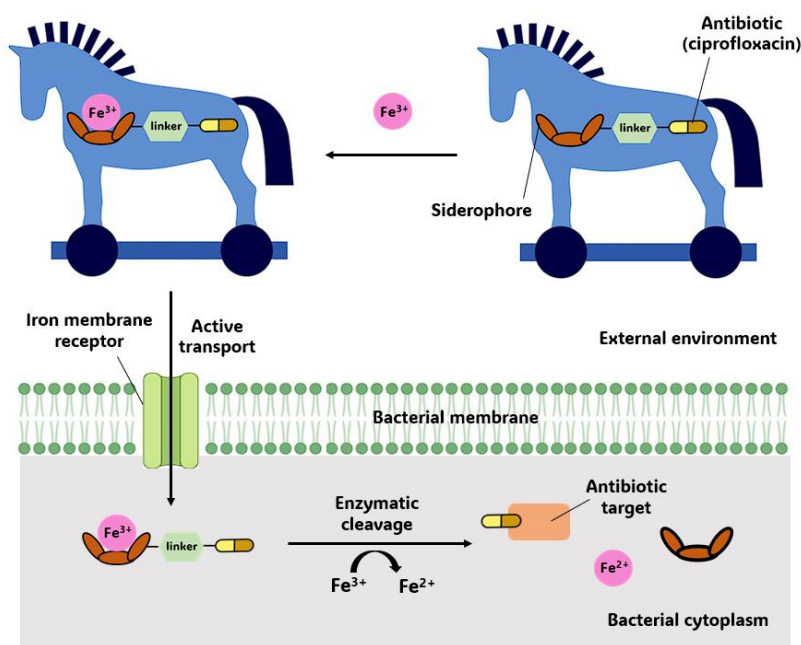


Figure 1: Scheme of the Trojan Horse Strategy.

21417 | Building a novel blood-brain barrier/glioblastoma interplay 3D *in vitro* model for stratification of drug efficacy

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Background & Aim: Glioblastoma (GBM) is the most common adult brain cancer, with a median survival of only 15 months. Resection followed by radiotherapy and temozolomide (TMZ) chemotherapy has remained the standard care for the past 20 years, although TMZ delivery is highly ineffective due to the presence of the blood-brain barrier (BBB). Thus, there is an urgent need to develop new therapies [1], but the prediction of efficacy of new drugs is often inaccurate since current models lack a close-to-native recapitulation of the 3D blood-BBB-GBM layered biostructure [2]. Herein, we propose a novel 3D BBB/GBM-*in-Transwell*[™] *in vitro* model of high reproducibility and translational potential. **Methods:** GBM multicellular microtissues (GMMs), composed by tumour cells, brain endothelial cells (BECs) and macrophages were assembled [3], and a GMM's brain-like Transwell[™] supporting scaffold (SS) optimized. For SS, fibrin (4.5 mg/mL) and collagen type I (Col, 4.5 or 1.5 mg/mL) were rheologically investigated and assessed for maintenance of cell viability (ATP measurements). For the assembly of the final model, GMMs were embedded into apical Transwell[™] SSs and co-cultured with a basolateral monolayer of BECs (**Figure 1A**). **Results:** Over 7 days, GMMs showed circular morphology and reached 300 µm average diameter. GMMs-*in-fibrin* or *in-Col* (4.5 mg/mL) hydrogels started to disassemble, showing poor cell viability (<50%) (**Figure 1B**). However, GMMs-*in-Col* (1.5 mg/mL) maintained cell viability (100%), presenting microtissues' circularity and 400 µm average diameter (**Figure 1C**). **Conclusions:** We successfully developed a novel BBB/GBM interplay 3D Transwell[™] model. In future work, this model will be integrated into MIVO[®] Transwell[™] technology [4] with controlled flow-dynamic conditions to mimic the blood flow *in situ*. Validating this scalable 3D *in vitro* model will significantly impact anti-GBM drug screening and approval, reducing animal use while maintaining a reliable *in vivo* predictive value, in line with the 3Rs policy.

Keywords: 3D Model, Blood-Brain Barrier, Drug Delivery, Glioblastoma, Hydrogel.

Acknowledgments

The authors thank the help of Ana Catarina Pacheco (Nanomedicines & Translational Drug Delivery, i3S, Porto, Portugal) in hydrogel production, Ana Margarida Carvalho (Nanomedicines & Translational Drug Delivery, i3S, Porto, Portugal) and Ângela Magalhães (Tumour and Microenvironment Interactions, i3S, Porto, Portugal) in rheological analysis.

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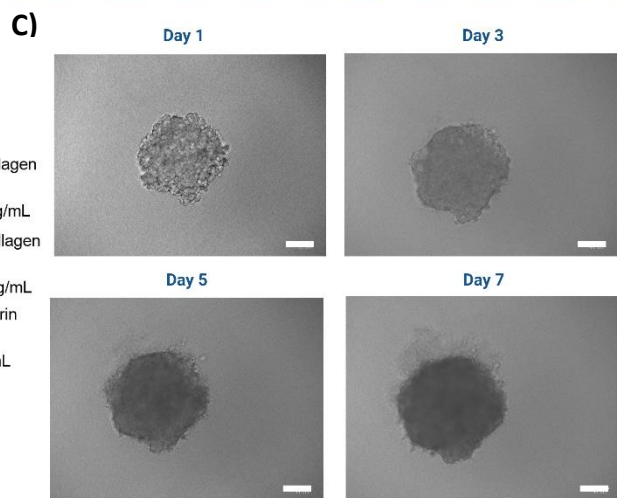
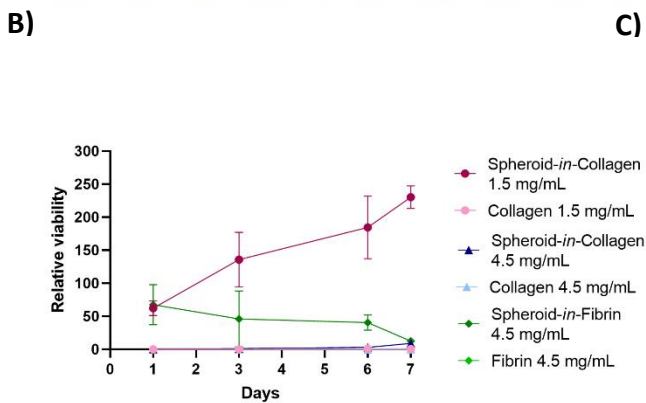
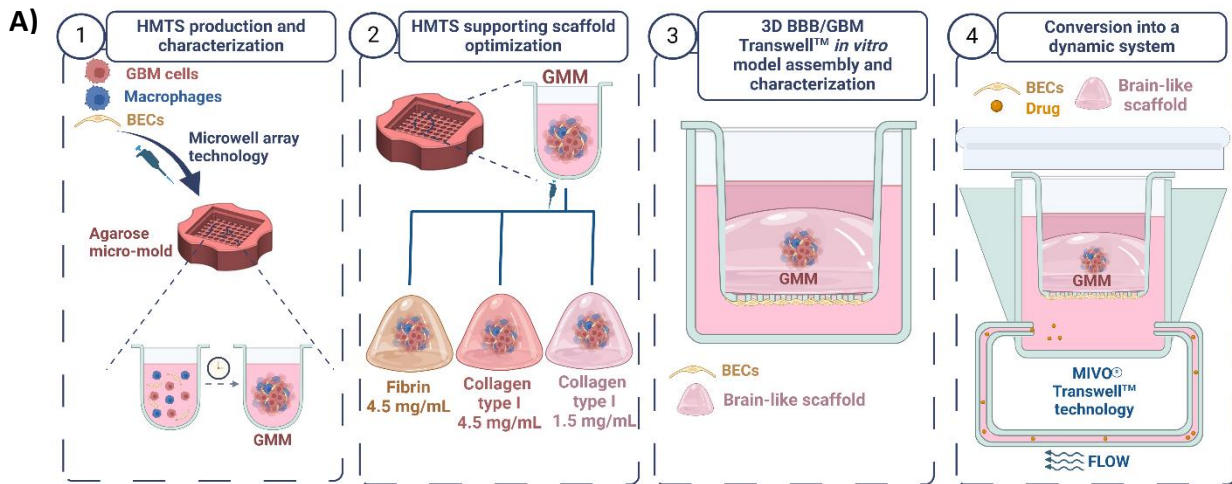


Figure 1: **A)** Study design for the complete assembly of the dynamic 3D BBB/GBM interplay Transwell™ *in vitro* model. **B)** Relative GMM viability over 7 days when embedded into different brain-like Transwell™ SSs at day 1 (fibrin 4.5 mg/mL, collagen 4.5 mg/mL, collagen 1.5 mg/mL). **C)** Morphological integrity of the GMM-*in*-Col (1.5 mg/mL) brain-like Transwell™ SS from day 1 to day 7. Scale bar represents 100 μm.

21429 | *In Vitro* Assessment of Lipid Digestion and Nutrient Bioaccessibility in the Elderly Population

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Background & Aim: The aging process induces substantial physiological changes that affect the digestive system (e.g., alterations in salivary flow, gastric activity, emptying, peristalsis, and intestinal enzyme secretion), collectively impacting nutrient digestion and absorption in the elderly. This study investigates *in vitro* micronutrient digestion, focusing on aging-related effects on lipid digestion and oxidation. **Methods:** Two model meals (salmon and chicken-based) were processed into puree or masticated forms and subjected to *in vitro* digestion assays. The INFOGEST 2.0 protocol, modified for gastric and intestinal impairment, was applied in quadruplicate (N = 48), with blank assays (N = 4). Lipid profile and oxidation status were evaluated using chromatography and spectrophotometry. **Results:** The study revealed compromised lipolysis, particularly in the elderly model where gastric and intestinal impairment were combined. This emphasizes the potential consequences for nutrient absorption and the associated health risks of incomplete lipid digestion, especially in the elderly. Secondary lipid oxidation analysis showed notable variations between meals and models, with a pronounced impact on meals richer in unsaturated fats. The soft salmon meal exhibited significantly lower oxidation rates in the intestinal phase for both elderly models, highlighting the potential protective effect of compromised gastric function on reducing secondary lipid oxidation risk, especially in meals with unsaturated fats. **Conclusions:** Gastrointestinal compromise may detrimentally impact lipid digestion, emphasizing the interplay between aging-associated changes and nutrient bioavailability, particularly the role of gastric function in lipid digestion.

Keywords: Elderly, Nutrient Bioaccessibility, Lipid Digestion, Lipid Oxidation, *In Vitro* Studies.

Acknowledgments

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21430 | Exogenous administration of delta-9-tetrahydrocannabinol affects adult hippocampal neurogenesis in female Wistar rats

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Background & Aim: The endocannabinoid system (ECS) oversees a multitude of physiological and pathological functions via CB1 and CB2 receptor activation, prompted by exogenous cannabinoids such as delta-9-tetrahydrocannabinol (THC) [1, 2]. Among its regulatory roles, ECS affects adult hippocampal neurogenesis (AHN), vital for cognitive processes like memory and learning [3]. Dysregulation of AHN contributes to neuropsychiatric disorders [1]. Yet, the impact of THC on AHN remains controversial, marked by conflicting research outcomes [4, 5]. In this study, we investigated the effects of THC on AHN in female Wistar rats, examining its interaction with the ECS and gonadal hormones. Our goal is to identify potential cannabinoid-based pharmacological targets for treating neuropsychiatric disorders. **Methods:** Female Wistar rats underwent gonadectomy under anesthesia at 8 weeks old and were subsequently administered estradiol benzoate (EB) and THC. Tissue sections containing the hippocampus were randomly selected at a sampling ratio of 1/12 and subjected to immunohistochemistry for assessing the expression of doublecortin (DCX) and Ki67 protein. **Results:** The results show that THC induces variation in the expression of neuropeptides in the hippocampal formation, namely DCX and Ki67. **Conclusions:** Our study provides new insights into the effects of THC on AHN in female rats, which can lead to future pharmacological targets in the fields of neurology and psychiatry.

Keywords: Hippocampal Formation, Delta-9-Tetrahydrocannabinol, Endocannabinoid System, Gonadal Hormones, Neurogenesis.

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21431 | Microbiome metabolites – new players in gastric cancer development

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Background & Aim: The development of gastric cancer is influenced by the microbiome. We hypothesize that the gastric microbiome has a unique metabolic program, which generates genotoxic metabolites that influence cancer development. Our main aim is to identify microbiome metabolites that contribute to gastric cancer. **Methods:** Untargeted metabolomics was performed in 30 patients, including 60 samples of tumours and paired normal tissues. The carcinogenic potential of metabolites overrepresented in tumours was assessed by extensive searches for toxicity and cancer association in the literature and multiple chemical databases. The effects of selected metabolites on oxidative stress, cell viability, and expression of genes of interest were evaluated in *in vitro* using a gastric cancer cell line. **Results:** A total of 873 high-quality annotated metabolites were detected. Differential abundance analysis revealed an enrichment of 41 metabolites in tumour tissues. Three metabolites were selected for *in vitro* studies: kynurenine (Kyn), aniline, and N8-acetylspermidine. None of the metabolites affected the production of reactive oxygen species and superoxide in cancer cells. Interestingly, in time course experiments (1h to 6h, 18h, and 24h), only Kyn induced a significant increase in cancer cell viability. A concomitant increase in the expression of the Kyn transporter SLC7A5 and of the aryl hydrocarbon receptor (AHR) was also observed. **Conclusions:** The metabolite profile in gastric cancer differs from that of the normal tissues. Kynurenine, a metabolite derived from tryptophan metabolism, increased cancer cell viability and led to overexpression of its transporter and of AHR transcription factor, which are frequently found overexpressed in gastric tumours, thus establishing a link between Kyn and gastric cancer.

Keywords: Gastric Cancer, Microbiome, Metabolites, Kynurenine, Aniline, N8-Acetylspermidine.

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21438 | Serum Ferritin Release During Infection – a Role for Extracellular Vesicles?

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Iron is an essential element for almost all living beings, but it can also be damaging to the organism. Therefore, iron metabolism must be tightly regulated. Ferritin (FT) is a central protein in iron homeostasis, and it is composed of two types of subunits the L (FTL) and H (FTH) subunits. FT's main function is to store iron intracellularly preventing cell damage. During an infection, as both the host and the pathogen need iron to survive there is a dispute for the element, causing an imbalance in host's iron homeostasis. Moreover, it has been described that upon *Mycobacterium avium* infection, macrophages secrete FTH and that FTH distribution impacts iron distribution [1]. Additionally, it has been shown that iron-overloaded fibroblasts secrete FT in CD63-positive extracellular vesicles (EV) [2]. With that in mind, we hypothesized that upon *M. avium* infection, secretion of iron-loaded FT in CD63-positive EVs by macrophages (**Figure 1**) may be important for FT and iron distribution in vivo. Histological analysis of the liver of infected and non-infected mice was performed, as well as an alanine-aminotransferase assay. Then, using infected primary macrophages, we investigated the presence of EVs in the cell lysates and supernatants. Afterwards, we isolated the EVs by ultracentrifugation. The vesicles were analyzed by Nanoparticle Tracking Analysis and the presence of several EV markers and both FTL and FTH were evaluated by Western Blotting. We confirmed a redistribution of FTH in the liver of infected mice. Elevated levels of alanine-aminotransferase indicate that cell death may contribute to FT release. Additionally, we observed that the expression of both subunits of FT increase in infected macrophages, and the presence of syntenin-1, an EV marker, is augmented in the vesicles of infected cells. Thus, our data shows that FTH is re-distributed in the liver during infection, in vivo. Moreover, our preliminary data indicate that *in vitro* infected macrophages release EVs with FTL.

Keywords: Iron, Ferritin, Infection, Mycobacteria, Extracellular Vesicles.

Acknowledgments

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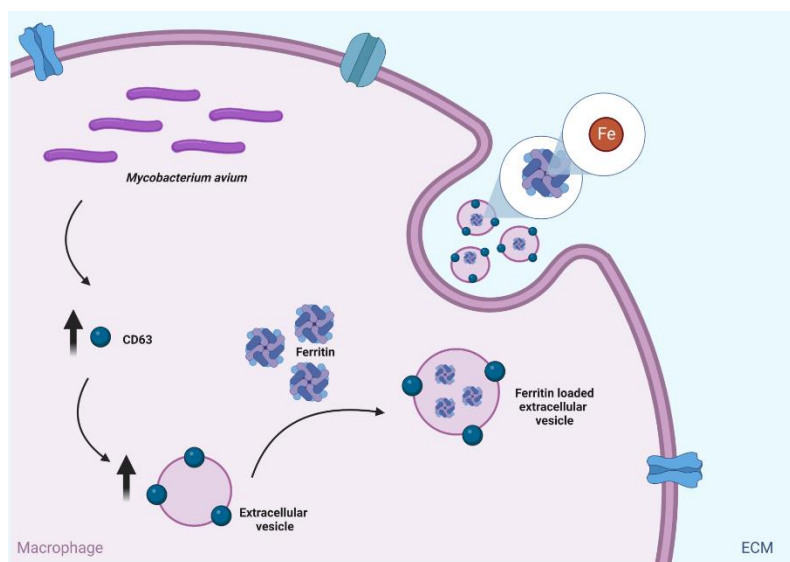


Figure 1: Project hypothesis. *M. avium* infection induces ferritin redistribution *in vivo*, leading to an increase in the expression of CD63 and production of CD63-positive EVs in macrophages. These cells will then secrete EVs with iron-loaded ferritin into the extracellular medium. Created in BioRender.com.

21457 | Overcoming pancreatic cancer drug resistance with a new inhibitor of DNA damage repair

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Background & Aim: Pancreatic ductal adenocarcinoma (PDAC) is a deadly cancer with a late diagnosis and a 5-year overall survival rate above 9% [1]. Currently, systemic chemotherapy is used as first-line treatment and includes gemcitabine (GEM) and FOLFIRINOX [1]. Yet, these standard treatments are associated with high toxic side effects, demanding personalized targeted therapies for PDAC [1,2]. The PARP inhibitor olaparib was approved for mutant BRCA PDAC therapy by triggering synthetic lethality [3]. Still, drug resistance in PDAC therapy is commonly observed, namely due to a reestablishment of homologous recombination (HR) pathway, which represents a major clinical limitation [2]. Recently, our group disclosed a new inhibitor of HR, BBIT20, that disrupts BRCA1/BARD1 interaction [4], showing potent antitumour activity in PDAC cells. BBIT20 also inhibited the multidrug resistance P-glycoprotein (P-gp) activity [5], fostering its potential to overcome PDAC drug resistance. **Methods:** The antiproliferative effect of BBIT20 in MIAPaCa-2 gemcitabine-resistant (GEM-res) cells was tested by the sulforhodamine B assay, apoptosis induction by Annexin V staining, and inhibition of p-gp activity using the multidrug efflux transporter P-gp ligand kit. A wound healing assay was made to test the antimigratory activity of BBIT20. The potent antiproliferative effect of BBIT20, alone and combined with olaparib/GEM, was analysed in patient-derived organoids (PDOs) of PDAC using CellTiter-Glo and apoptosis induction by quantifying activated caspase-3/7. **Results:** MIAPaCa-2 GEM-res showed no cross-resistance to BBIT20. BBIT20 sensitized MIAPaCa-2 GEM-res cells to GEM, inducing apoptosis and inhibiting P-gp activity. Of note, it also repressed migration of these cells. In three PDOs of PDAC, BBIT20 induced potent growth inhibition, and sensitized the most

drug resistant PDO to olaparib and GEM, enhancing apoptosis. **Conclusions:** BBIT20 is a promising anticancer agent in PDAC treatment, overcoming acquired resistance.

Keywords: Pancreatic Ductal Adenocarcinoma, Targeted Therapy, Homologous Recombination, Drug Resistance.

Acknowledgments

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21465 | Human Induced Pluripotent Stem Cells as a Disease Model for MPS III

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Background & Aim: Mucopolysaccharidosis type III (MPSIII) is a rare metabolic disorder, caused by inherited defects in one of the enzymes involved in the degradation of glycosaminoglycan (GAG) heparan sulfate. Based on the mutated enzyme, MPSIII can be divided in subtypes (A, B, C and D) all presenting as multisystemic diseases, with early-onset, severe, and progressive degeneration of the CNS. Unfortunately, no effective disease-modifying treatment is available (1). Regarded as the gold standard of in vitro models, patient-derived fibroblasts fail to recreate some disease hallmarks. On the other hand, patient-derived Induced pluripotent stem cells (iPSCs) retain the donors' genetic background, being closely related to the disease's pathophysiology, while presenting a high proliferative capacity and differentiation potential. Thus, iPSCs are a great tool to study the disease's mechanisms, as well as for compound screening and evaluation of drug efficacy (2). With this work, we intend to establish and characterize two iPSC lines for MPSIII (C and D). **Methods:** Patient-derived fibroblasts were reprogrammed into iPSCs using the Epi5™ Episomal iPSC Reprogramming Kit. iPSC colonies were manually collected for further expansion and analysis. PCR was used to detect the episomal iPSC reprogramming vectors. Sanger sequencing was performed to confirm the disease genotype. Fluorometric enzyme assays were executed for the corresponding enzymes. GAGs and Karyotype are currently being analyzed. **Results:** Around 24 and 20 days after transfection, for MPS IIIC and MPS IIID, respectively, the first iPSC colonies were observed. The absence of the episomal vectors was confirmed for both cell lines, as well as their disease-related genotypes. Enzymatic assays revealed either absent (MPS IIIC) or residual (MPS IIID) activity for the corresponding enzymes.

Conclusions: Both cell lines exhibited MPS III-linked genotype and phenotype. However, extra analyses must be conducted. Further perspectives include the differentiation of these cells into neurons for subsequent drug testing.

Keywords: Mucopolysaccharidosis Type III, Induced Pluripotent Stem Cells, Disease Modelling.

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21467 | Identification of bone loss biomarkers in cystic fibrosis patients

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Background & Aim: Cystic fibrosis (CF) transmembrane conductance receptor (CFTR) mutations cause CF. CF associates with higher susceptibility to lung infections and hampered bone homeostasis. We hypothesize that the immune response to lung colonization (mainly by *P. aeruginosa*, *S. aureus*, and non-tuberculous mycobacteria) increases circulating mediators, altering bone homeostasis. We aim to investigate the molecular impact of bacterial lung infection on the bone and search for potential bone health biomarkers (PBHB) to monitor bone health in CF patients. **Methods:** Proteomic analysis of the plasma of 28 adult CF patients has been performed to detect differentially present proteins (DPP) between CF patients with low and normal bone mineral density (BMD). DPP were subjected to functional enrichment analysis, selecting 3 candidates as PBHB. Further analyses were performed correlating the PBHB abundance to patients' clinical data. Simultaneously, human macrophages were infected with CF patients' clinical isolates of *P. aeruginosa*, *M. avium* or *S. aureus* to determine whether PBHB are produced in response to infection. **Results:** BMP4, CCDC88A and SAA1 were selected as PBHB. CCDC88A and SAA1 are less abundant in patients with low BMD compared to those with normal BMD. CFTR treatment increases BMP4 abundance in patients with low BMD. Moreover, BMD correlates positively with BMP4 in patients under CFTR modulators treatment whereas BMD correlates negatively with CCDC88A in patients without treatment. SAA abundances negatively correlate with lung function (measured by ΔFEV_1) in patients with normal BMD. On the other hand, CCDC88A and lung function had a negative correlation in patients with low BMD. Studies to determine whether PBHB are produced by macrophages in response to infection are ongoing. **Conclusions:** BMP4, CCDC88A and SAA1 are potential bone health biomarkers. The investigation of PBHB is crucial since there's a need for practical bone health diagnostic methods to monitor CF bone disease progression.

Keywords: Cystic Fibrosis Bone Disease, Lung Colonization, Biomarkers.

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21522 | Exploring the complexity in Niemann-Pick Type C Disorder: investigating cellular targets, potential biomarkers and disease-causing variants

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Background & Aim: Niemann-Pick type C (NPC) is a monogenic autosomal recessive disease causing neurological and motor symptoms. It's caused by pathogenic variants in *NPC1* or *NPC2* genes that encode two proteins crucial for lipid transport, leading to the accumulation of free cholesterol and other lipids in lysosomes. Multiple *NPC1* disease-causing variants exist, with manifestations being very heterogeneous even within the same variant, turning the monogenic view more complex. Studying microRNAs (miRNAs) can help understand the complexity of NPC by examining their impact on gene regulation and biomarker applications. The aim of this work is to identify differentially expressed miRNAs in NPC patient serum and sequence Clinical-Exome in two atypical NPC patients to understand if other genes contribute to their disease. **Methods:** NGS analyses, namely Clinical Exome and RNA-Seq were conducted. Non-coding RNA-Seq allowed to study the miRNA profile and the most prevalent hits were validated in patient's serum using qRT-PCR studies. Sanger sequencing was also performed to confirm the new variants. **Results:** Two miRNAs were identified as being differentially expressed and are presently under validation in blood serum. The Clinical Exome analysis of the two individuals with atypical NPC clinical manifestation led in the first case to the identification of a variant of unknown significance (VUS) in the *NPC1* gene (in one allele) and of two VUS in a kinase-encoding gene in compound heterozygosity. For the other case two distinct variants were identified in *NPC1* gene, one of them is already reported as being pathogenic and the other is a VUS. Further studies addressing the interplay between the variants identified in the two genes are now envisaged. **Conclusions:** In conclusion, due to the severity and complexity of this disease it is essential to

identify novel and more effective biomarkers to decrease the diagnosis timeline. It is also necessary to study other contributors besides disease-causing variants in *NPC1* or *NPC2* genes to discover novel disease players.

Keywords: Niemann-Pick Type C, MicroRNA, Disease-Causing Variants, Variants of Unknown Significance.

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21556 | Harnessing milk-derived nanoplatforms to mitigate oxidative stress in hypertension

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Background & Aim: The management of hypertension poses major public health challenges [1]. In this sense, the health industry is witnessing a paradigm shift that prioritizes the enhancement of nutrition through the incorporation of bioactives in food products [2]. Casein micelles, derived from milk, serve as nanocarriers for encapsulating polyphenols to overcome their low bioavailability [3] [4]. While polyphenol-based formulations for hypertension exist, information on their antihypertensive mechanisms is limited [5]. Thus, this work strived to achieve relevant insights in representative models of endothelial damage in this context. **Methods:** Casein-based formulations, containing epigallocatechin (EGCG) and resveratrol (RESV), were prepared. Confocal laser scanning microscopy was utilized to assess their ability to prevent oxidative stress generation. THP-1 derived macrophage and human umbilical vein endothelial cells (HUVEC) were incubated with different casein-polyphenol formulations. After 24 h, the oxidative damage was induced using H₂O₂ for 1 h, and dichlorodihydrofluorescein diacetate (DCFDA) was used to probe intracellular reactive oxygen species (ROS) resulting from H₂O₂ exposure (Figure 1). **Results:** Oxidative stress is the key contributor to endothelial dysfunction and inflammation, leading to hypertension development. When cells were previously incubated with the formulations, ROS production was considerably less notorious, comparatively to the damage controls. In fact, all tested formulations display the potential to inhibit ROS production in HUVEC and THP-1, suggesting a possible modulation of inflammatory processes associated with hypertension. **Conclusions:** This study attested the relevance of the formulations as a promising strategy for addressing oxidative stress-related conditions. Consequently, it holds the potential to propel the dairy industry towards the current perspective of harnessing therapeutical actions through the consumption of functional foods.

Keywords: Milk-Derived Nanoplatforms, Casein Micelles, Polyphenols, Hypertension, Oxidative Stress.

Acknowledgments

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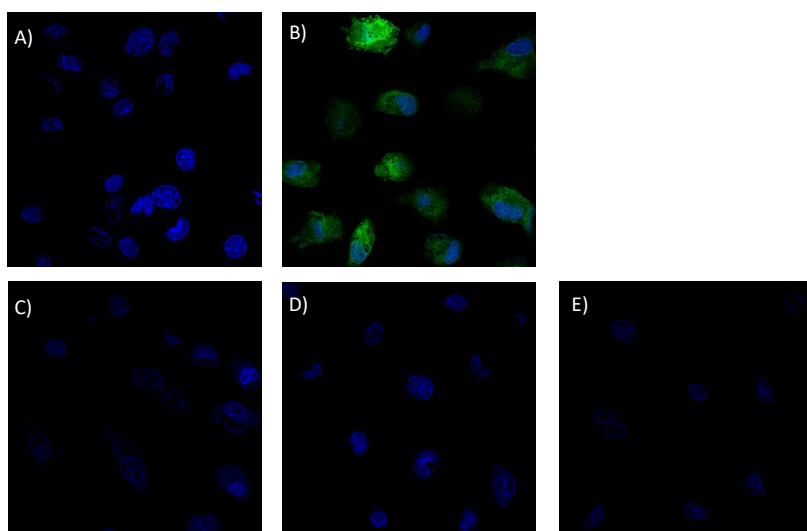


Figure 1: Assessment of the potential of casein micelles to inhibit ROS production by HUVEC cells. A) Untreated cells. B) Damage with H_2O_2 . C) Incubation with casein micelle control followed by H_2O_2 . D) Incubation with casein-EGCG formulation followed by H_2O_2 . E) Incubation with casein-RESV formulation followed by H_2O_2 . Cells were stained for nuclei (Hoechst 33342, blue signal) and for ROS (DCFDA, green signal).

21570 | The action of selected natural products as antibiotic resistance modifiers and biofilm control agents

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Background & Aim: The rising threat of multidrug-resistant bacteria, especially in biofilms, demands innovative and efficient treatment strategies. Therefore, this study aimed to assess the antibiofilm and antibiotic resistance-modifying potential of natural compounds, such as phytochemicals and natural deep eutectic solvents (NADES). **Methods:** *In vitro* assays were conducted using two monoterpenes (menthol and linalool) and a choline chloride- raffinose NADES in combination with ten antibiotics (methicillin, amoxicillin, oxacillin, erythromycin, ciprofloxacin, mupirocin, fusidic acid, tetracycline, tobramycin, and gentamicin) against *Escherichia coli* CETC 102 and *Staphylococcus epidermidis* ATCC 35984. Minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) were determined for the phytochemicals. Disc diffusion was used to evaluate bacterial susceptibility to antibiotics and the potential of the dual combinations. Biofilm control efficacy was assessed through biomass and metabolic activity quantification, along with cell culturability. **Results:** Menthol displayed a MIC and MBC of 800 µg/mL against *E. coli* and an equivalent MIC against *S. epidermidis*. Linalool exhibited a MIC of 800 and 400 µg/mL against *E. coli* and *S. epidermidis*, respectively. Disc diffusion indicated a potentiation effect of both molecules on erythromycin against *E. coli*, and of menthol on amoxicillin against *S. epidermidis*. Biofilm control studies showed that both molecules applied individually reduced more than 90% of the biofilm's metabolic activity, yielding, in some cases, a total reduction of culturable cells. Moreover, the dual combinations with antibiotics enhanced their activity up to 40% in biofilm metabolic inactivation, 13% in biomass removal, and 2.8 logs in culturability reduction. **Conclusions:** This study has revealed promising results, showing the potential of these terpenes and NADES as antibiotic resistance modifiers and supporting menthol and linalool as strong antibiofilm agents.

Keywords: Antibiotics, Antimicrobial Resistance, Phytochemicals, Natural Deep Eutectic Solvents, Biofilms.

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21591 | Preferences for engagement in decision-making about health data sharing for research among rare diseases patients and informal carers

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Background & Aim: As more aspects of people's lives become data-driven, it is increasingly important to make well-informed decisions about whether to share one's health data and for which purposes. This is especially relevant for people with rare diseases and their carers, whose data are more susceptible to breaches in privacy and inappropriate use, but who may also benefit significantly from data-intensive biomedical research. A new professional specialty could support patients and carers in making informed decisions about health data sharing. This study aimed to assess how participants would like to make decisions about sharing their health data, including the need for support by trained professionals, namely data counsellors. **Methods:** This observational, cross-sectional study draws on a hospital-based survey carried out with 489 informal carers and 162 rare disease patients at two Reference Centers for rare diseases in Portugal, between June 2019 and March 2020. Participants were asked to select one out of three modes of decision-making concerning the sharing of their health data for research: deciding alone, deciding with support or delegating the decision. Data analysis was conducted employing descriptive and inferential statistical methods. **Results:** The majority of participants revealed a preference for deciding with the support of other people (62%). Among those, 60% indicated a preference for a data counselor. Those with higher levels of education, upper white-collar occupations, and satisfied with own health preferred the support of a data counselor to help them decide about health data sharing ($p < 0.05$). **Conclusions:** The majority of participants expressed the need for support when making a decision about health data sharing for research purposes, with more than half indicating a preference for support from a data counselor. This is aligned with recent proposals advocating for the creation of a novel medical specialty centered on health data counselling.

Keywords: Data Governance, Decision-Making, Health Data Sharing, Rare Diseases, Data Counsellors.

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21605 | SGLT2 Inhibitors: Novel Approach to Modulate Appetite Hormones and Cardiomyocyte Function

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Background & Aim: Emerging as a class of oral antidiabetic drugs, sodium-glucose cotransporter 2 inhibitors (SGLT2i), used in patients with type 2 diabetes, offer promising results in weight loss, decreasing cardiometabolic biomarkers, thus improving overall cardiac function. The aim of this study is to assess whether SGLT2i can impact food and water consumption, hormone regulating appetite mechanisms, and morphologic parameters. **Methods:** Thirty-nine male ZSF1 rats were divided into two lean (Ln) and two obese (Ob) groups, fed with normal diet (ND) or treated with SGLT2i in food (30 mg/Kg/day). Body weight (BW), food, water, adiponectin and leptin were measured during nine weeks of treatment. Histochemistry analysis was performed with hematoxylin and eosin to determine the cross-section area in visceral adipose tissue (VAT), subcutaneous adipose tissue (SAT), and cardiomyocytes. **Results:** SGLT2i treatment promoted an increased food and water intake in lean rats (Ln_ SGLT2i). However, the BW in this group was markedly reduced compared with non-treated lean (Ln_ND). Furthermore, the treatment promoted higher water intake despite no differences in BW in obese rats (Ob_ SGLT2i) compared to control (Ob_ND). Exploring the hormone-regulating appetite mechanisms, SGLT2i treatment showed significant increased in adiponectin levels in both Ln and Ob, however leptin levels only validated the hyperleptinemia in Ob. The ratio adiponectin/leptin was markedly significant increase in Ln_ SGLT2i rats. At the endpoint, the treatment decreased perigonadal fat weight (PFW) in both groups. Aligned with these, cross-section areas of VAT, SAT and cardiomyocytes were markedly increased in Ob, and the treatment decreased these areas in Ob_ SGLT2i. **Conclusions:** SGLT2i treatment increased food and water intake as also the adiponectin/leptin

ratio in Ln. Additionally, the treatment promoted PFW loss and increased the adiponectin levels in both groups and decreased the cross-section area of VAT, SAT, cardiomyocytes in Ob.

Keywords: SGLT2i, Hormone Regulating Appetite, Adiponectin/Leptin Ratio, Cardiac Function.

Acknowledgments

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21626 | Exploring the Cytotoxic Potential of New Quinones against Cancer Cells

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Currently, an increase in cancer cases globally is observed. According to the WHO mortality database, malignant neoplasias in Portugal in the last survey account 28,544 deaths in 2019, the specific cause, gender and age group being considered, which indicates a higher incidence in males with around 16,865 deaths in the case of females 11,679 deaths [1]. According to American Cancer Society ACS, cancer is one of the main causes of premature deaths worldwide [2]. With the growing incidence of cancer and the increase in demand for treatment globally, a crisis could be triggered in the next 20 years [3]. Therefore, the need to continuously research and discover new molecules is of great importance. The antitumour properties of quinones have been known for decades [4]. In this work, we assessed the cytotoxicity test of 33 new molecular derivatives of quinones, characteristic naphthoquinone nucleus with alteration in the carbonyl groups at position 1 and 4, additions at 2 and 3, towards two cancer cell lines AGS (gastric adenocarcinoma), A549 (lung carcinoma) and the non-cancerous cell line Hacat (keratinocytes). Initially, all samples were tested at 100 μ M using AGS cells. Sample 9 caused 55% viability, while sample 20 in the 24-hour test demonstrated 78% viability, lowering to 65% viability at 48h of incubation. In parallel, sample 9 was tested with A549 cells, resulting in 81% of viability. Overall, toxicity towards non-cancer cells was low or inexistant, which suggests selectivity for cancer cells. Future perspectives for the study include carrying out tests that demonstrate the molecule's route of action.

Keywords: Synthesis, Cancer, Quinones.

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21632 | Impact of COVID-19 pandemics on cancer diagnose rate in Portugal

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Background & Aim: The COVID-19 pandemic enormously impacted health services globally. Healthcare systems had to reallocate human, technological, and economic resources towards COVID-19, which compromised other essential services. We aimed to evaluate the impact of the Covid-19 pandemic on the diagnosis of cancer in Portugal. **Methods:** An interrupted time series (ITS) analysis was conducted with data of monthly diagnosed cases of neoplasms between 2018 and 2020, provided by the Portuguese Oncology Registry for 7 major cancer topologies described by the International Categorization of Diseases for Oncology (ICD-O-3.2): C18 colon, C20 rectum, C34 bronchus and lung, C42 hematopoietic and reticuloendothelial, C50 breast, C53 cervix uteri, and C61 prostate. ITS was performed with Casual Impact on R/RStudio, a Bayesian method to obtain a counterfactual time series. Three comparator monthly series were used: births (number), NHS drug expenditure (million euros), and statin consumption (DDD/1000inh/Day). Analyses were conducted at a district level. **Results:** Among the 7 neoplasm topologies, Portugal had 31,876 cases diagnosed in 2018, 31,936 in 2019 and 25,458 in 2020. Compared with the contrafactual series, this represented a -15% relative effect (95%IC -20%: -9%) of the COVID-19 event (March 2020). Similar reduction rates existed for the 7 cancer topologies. Significant relative effects existed for 12 of the 20 districts of Portugal. Inland districts had significantly higher reductions in diagnosis rates ($p=0.008$), with Bragança and Castelo Branco being the most affected districts (-59% and -51%, respectively). **Conclusions:** The COVID-19 pandemic represented a major distress in cancer diagnosis in Portugal. Future analyses should assess the consequences of these missed diagnoses. Strategies to mitigate the impact on cancer diagnosis and treatment must be prioritized to ensure the delivery of timely and high-quality care to patients.

Keywords: Neoplasms, COVID-19, Pandemics, Early Detection of Cancer.

Acknowledgments

We acknowledge the Portuguese National Oncologic Registry for the data provided.

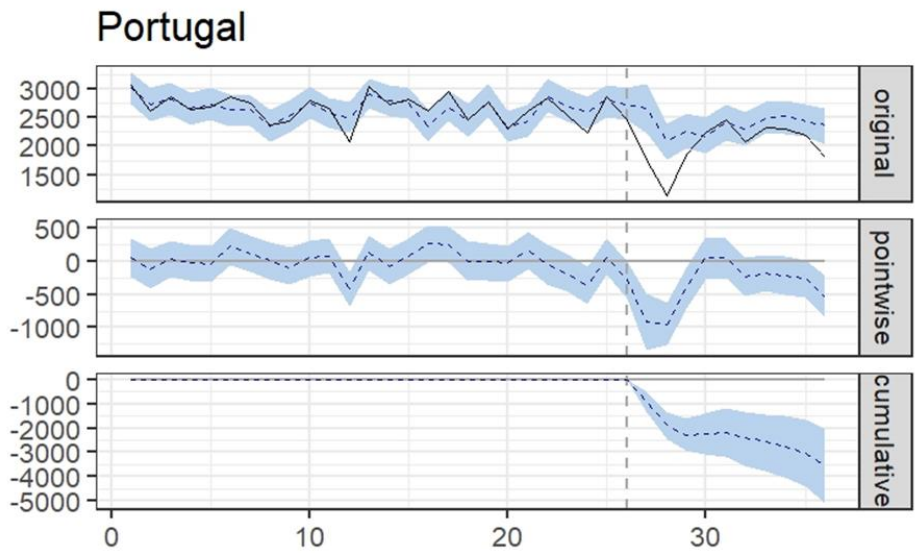


Figure 1: Interrupted time series analysis of cancer diagnosed in Portugal (2018-2020).

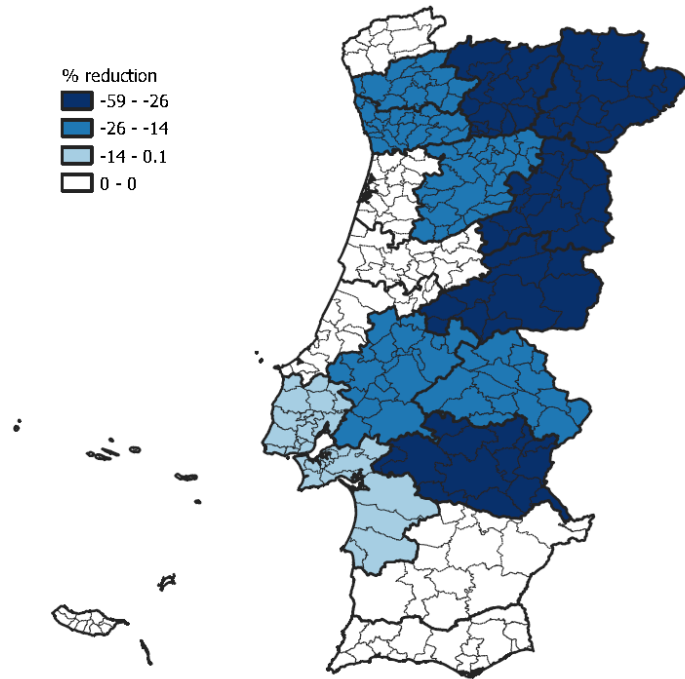


Figure 2: Geographic distribution of cancer diagnosis reduction after the COVID-19 pandemic.

21638 | Exploring the Interplay of Emotional States and Pain Perception in Portuguese Medical and Nursing Students: Insights from a Cross-Sectional Study

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Background & Aim: Fear of pain (FOP) is known to worsen pain outcomes¹ and its escalation leads to heightened pain intensity^{2,3}. Negative emotional states (NES) can also increase FOP⁴. Furthermore, the relationship between FOP and pain threshold remains unclear^{5,6}. Therefore, our aim was to assess FOP in medical and nursing students, evaluate its effect on heat pain threshold (HPT), and analyze its association with sociodemographic factors, NES, and previous pain experiences (PPE). **Methods:** A survey based on validated Portuguese versions of the FPQ-9, DASS-21 and PPE questions was carried out. Participants were then invited for a follow-up quantitative sensory testing (QST) to assess HPT. **Results:** No association was found between HPT and total FOP (Pearson coefficient: $r=-0.029$, $p=0.781$) or any FOP subscale. Female sex was associated with a higher fear of medical pain (Mann-Whitney U test: $p=0.021$). Higher stress was linked to increased fear of severe pain (Pearson coefficient: $r=0.088$, $p=0.042$). Experience of falling down a flight of concrete stairs was associated with lower fear of that pain (Mann-Whitney U test: $p=0.003$), as was experience of receiving an injection in the mouth (Mann-Whitney U test: $p=0.032$). However, when considered collectively, previous painful medical encounters were associated with greater fear of medical pain (Pearson coefficient: $r=0.108$, $p=0.012$). No association was found between total FOP (or any subscale) and year of study for both medical (Pearson coefficient: $r=-0.040$, $p=0.442$) and nursing students (Pearson coefficient: $r=0.057$, $p=0.513$). **Conclusions:** NES and FOP were reported by a significant number of medical and nursing students, with stress and sex found to influence these variables. However, inconsistent results regarding PPE, HPT and their association with FOP underscore the need for more detailed analyses in future studies. Additionally, the lack of association between FOP and curricular year highlights the need for enhanced pain education⁷.

Keywords: Fear of Pain, Pain Threshold, Medical Students, Nursing Students.

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21641 | Rimonabant and dimethyl fumarate, two drugs commonly associated with neuropsychiatric adverse events, increase histone acetylation in a neuronal cell model

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Background & Aim: Some pharmaceutical drugs have been associated with psychiatric/psychological adverse events (PPAEs), including anxiety, depression, cognitive impairment, which are often only detected at late stages of clinical trials (Phase III) or during pharmacovigilance. In particular, dimethyl fumarate (DMF), an anti-inflammatory drug used for the management of relapsing-remitting multiple sclerosis, and rimonabant (an inverse agonist of the cannabinoid receptor 1 used as an antiobesity drug), have been reported to rank among the top-10 pharmaceutical agents most associated with a high prevalence of PPAEs [1]. Considering the importance of epigenetic signaling in regulating neuronal function, we aimed to ascertain the ability of DMF and rimonabant to promote epigenetic changes in neuronal cells as a potential mechanism underlying their neurotoxicity. **Methods:** SH-SY5Y human neuroblastoma cells were exposed to two pharmacologically relevant concentrations of DMF (0.1 and 10 μ M) and rimonabant (0.01 and 1 μ M) for 96 h and the acetylation of histones H3 and H4 was measured using a commercial fluorometric kit (Abcam). Histone acetyltransferase (HAT) activity was assessed with a commercially available colorimetric kit (Abcam). **Results:** Our preliminary data showed that DMF and rimonabant increased the global acetylation levels of histone H3 (1.7- and 1.6-fold for 0.1 μ M and 10 μ M DMF, respectively; and 2.7- and 2.2-fold for 0.01 and 1 μ M rimonabant, respectively) compared to the vehicle control (0.1% DMSO). However, none of the drugs, at the tested concentrations, affected histone H4 acetylation or HAT activity, suggesting that these drugs-induced histone acetylation may be promoted by a different mechanism. **Conclusions:** Additional research is needed to better understand DMF and rimonabant's epigenetic impact on neuronal function, particularly how these drugs-promoted histone modifications can affect specific neuronal mechanisms and their possible association with the onset of PPAEs.

Keywords: Epigenetic Signalling, Histone H3, Histone Acetyltransferase, Histone Acetylation, Psychiatric/Psychological Adverse Events.

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21660 | Understand the Role of Glycans in the Oncogenesis of Pediatric Sarcomas

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Background & Aim: Sarcoma is a cancer that derives from mesenchymal cells and is more prevalent in young ages (>18) when compared to adults[1]. The most common Pediatric Sarcomas (PS) types are rhabdomyosarcoma, osteosarcomas and Ewing's sarcoma[2]. In clinical practice, these cases are very challenging to diagnose and treat, thus it remains imperative to identify new biomarkers for diagnosis and for the development of effective therapies[3], [4]. Aberrant expression of glycans is a feature in cancer, with these alterations in cellular glycosylation drastically impacting tumour development and progression[5,6]. In this project, we aimed to characterize the expression of aberrant glycans in the most prevalent PS subtypes and unveil their biological roles in oncogenesis. **Methods:** PS cell lines were used to assess the expression of cancer-associated glycans by immunofluorescence and flow cytometry. To unveil the biological role of identified glycans we glycoengineered cell lines, by CRISPR/Cas9 technology, and evaluated several parameters such as proliferation, motility and activation of receptor tyrosine kinase (RTK). **Results:** Our results showed a differential expression of cancer-associated glycans in the different cell lines. Heparan sulfate (HS) structures were identified in all cell lines with heterogenous expression. By knocking-out (KO) EXTL3 enzyme, the enzyme described as involve in the biosynthesis of HS structures[7], we abrogate the expression of HS structures. Additionally, EXTL3 KO led to differences in cell proliferation, motility and activation of RTKs. **Conclusions:** We characterized the glycoprofile of cell lines derived from the tree most prevalent PS and evaluated the expression of HS structures in malignant characteristics of sarcomas. In the future, we want to validate the expression of the identified altered glycans in PS tissue samples from 20 years-retrospective cases. This validation will help identify PS "glycosignatures" and understand their clinical implications.

Keywords: Pediatric Sarcomas, Aberrant Glycans, Oncogenesis, Glycosignatures, Biological Implications.

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Development: An In Vitro Investigation

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Background & Aim: Cancer incidence has been increasing worldwide, over the past few years. “Chemobrain” refers to alterations in cognitive function after cancer treatment, including memory deficits and reduced attention capacity [1]. The blood-brain barrier restricts the entry of certain anticancer drugs into the brain. However, “chemobrain” can also arise from factors extending far beyond direct drug exposure to the brain, such as inflammation [1]. This work aims to assess how neurons are affected by different anticancer drugs, such as doxorubicin (DOX), methotrexate (MTX) and sunitinib (SUN), all known to cause clinical cognitive deficits. **Methods:** Differentiated human neuroblastoma cells (SH-SY5Y) were exposed for 24-h or 48-h to clinically relevant concentrations of DOX (0.1-10 μM), SUN (1-10 μM) and MTX (5 and 10 μM). In a different paradigm, autophagy inhibitors [3-Methyladenine (3-MA) or chloroquine (CLQ)] were used to determine their effects on SUN cytotoxicity. Two classical cytotoxicity assays (Neutral red uptake and MTT reduction) were performed at the end of the exposure times. **Results:** DOX led to concentration-dependent cytotoxicity, which was amplified in the longer exposure time in both assays. On the other hand, MTX caused significant toxicity at 5 μM and 10 μM , which was time-dependent but not dose-dependent in the MTT reduction assay. In the NR uptake assay, toxicity was seen only on the longer incubation time. Regarding SUN, both assays revealed a time and concentration-dependent cytotoxicity. In SUN, cells appeared with yellow inclusions and autophagy modulators were used. As for autophagy inhibitors, results were dissimilar, since for SUN 10 μM , 3-MA was partially protective, whereas CLQ significantly increased SUN’s cytotoxicity in both assays at 24h. **Conclusions:** These findings highlight DOX’s, MTX’s and SUN’s cytotoxicity in neurons, with DOX and SUN being equally potent. Additionally, autophagy inhibitors suggest dysregulation of autophagy as a possible mechanism underlying SUN’s neurotoxicity. Nonetheless, further research is needed.

Keywords: Chemobrain, Chemotherapy, Neurotoxicity, Neurons, Cancer.

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21664 | Aryl Hydrocarbon Receptor in Melanoma: From a sensor to a regulator of the tumour microenvironment

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Background & Aim: Cutaneous melanoma is a skin cancer that develops in melanocytes, melanin-producing cells¹. During transformation and melanoma development, melanocytes lose their interaction with keratinocytes leading to deregulated proliferation and invasion¹. Thus, it is of utmost importance to understand the molecular pathways involved in the crosstalk between melanocytes/melanoma cells and other cells in the skin microenvironment to improve the current or develop new treatments for melanoma. The aryl hydrocarbon receptor (AHR) is a ligand-dependent transcription factor that can bind to different types of ligands². Upon binding, it is involved in numerous functions, as melanogenesis and tumourigenesis. In melanoma, sustained AHR activation has been linked to resistance to therapy³. Our group has shown that the AHR can sense pigments, hence we hypothesized that the AHR can also sense skin pigmentation and modulate the melanoma microenvironment⁴. **Methods:** We tested sensing of pigmentation-related molecules by the AHR in melanocytes, keratinocytes, and macrophages using AHR-reporter cell lines and gene expression analysis. Further, we evaluated the expression of AHR-dependent genes in WT/AHR-KO cells. Lastly, we induced pigmentation in melanocytes and assessed its impact on the AHR. **Results:** We unveiled pigmentation-related molecules able to modulate the AHR pathway in all the cell types tested, and confirmed by gene expression analysis of AHR-KO cells. Exposure of macrophages to supernatants from pigmented cells led to increased AHR activation. Further, under pigmentation-stimulating conditions, we observed a concomitant increase in pigmentation and AHR activation. **Conclusions:** These results show that the AHR is activated by pigmentation. With this work, we will provide new insights into melanoma biology, specifically the molecular sensing and signaling pathways underlying melanoma susceptibilities and microenvironmental dynamics, with potential implications for treatment strategies.

Keywords: Aryl Hydrocarbon Receptor, Melanoma, Melanoma Microenvironment.

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Zoos

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Background & Aim: *Enterocytozoon bieneusi*, an intracellular eukaryotic fungus, is recognized as a significant pathogen affecting humans, particularly those with compromised immune systems. While its transmission modes are still not fully elucidated, fecal-oral transmission remains the primary route. With a wide host range, the zoonotic potential of *E. bieneusi* is a concern, albeit direct evidence of animal-to-human transmission remains scarce. Genotyping based on the internal transcribed spacer (ITS) region facilitates the delineation of genetic diversity, with potentially zoonotic genotypes predominantly associated with Groups 1 and 2. Despite the broad spectrum of susceptible mammalian hosts, research into microsporidian infection among zoo animals remains limited. This study aimed to evaluate the prevalence of *E. bieneusi* infection across diverse captive animals, focusing on zoo settings in Portugal. **Methods:** Fecal samples were collected from a variety of animals, and molecular detection of *E. bieneusi* was conducted using nested PCR targeting the ITS region. **Results:** From 126 fecal samples, 1.59% (95% CI: 0.19–5.62) tested positive for *E. bieneusi*, with non-human primates (NHP's) exhibiting an 18.18% (95% CI: 2.28–51.78) occurrence. Phylogenetic analysis revealed clustering within Group 2 genotypes, indicating potential zoonotic implications. **Conclusions:** The study highlights the need for further research to understand the epidemiology of *E. bieneusi* in zoo environments and its potential transmission pathways to humans

Keywords: *E. Bieneusi*, Microsporidia, Zoo, Non-Human Primates, Portugal.

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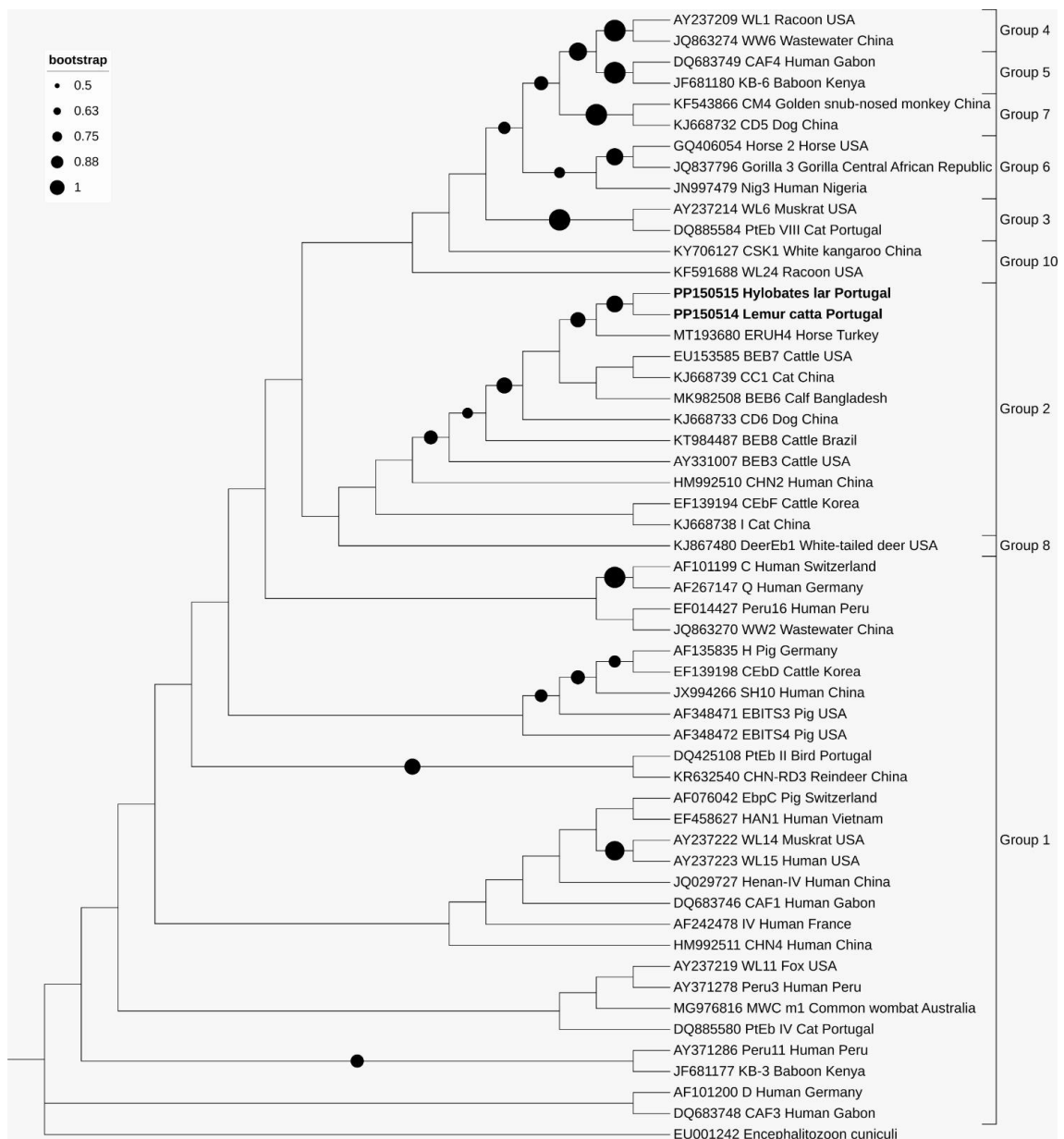


Figure 1: Phylogenetic analysis of *Enterocytozoon bieneusi* sequences obtained in this study (highlighted in bold) and reference genotypes, identified with the respective accession numbers, genotype, host and country of origin. Phylogenetic tree was performed using the maximum likelihood method and the Hasegawa Kishino-Yano model.

21678 | Sodium Intake in U.Porto college students and influencing sociodemographic and lifestyle factors

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Background & Aim: Sodium intake is highly associated with hypertension and other cardiovascular diseases, one of the main global health concerns. Studies show that most people (regardless of their country of origin), consume more sodium than what's recommended by the World Health Organization (WHO). Our study aims to describe sodium intake among U.Porto college students and to identify related sociodemographic and lifestyle factors. **Methods:** A survey was conducted among the student population, regarding food consumption (24-hour recall), sociodemographic data (sex, age, field of study) and lifestyles, namely physical activity and adherence to the Mediterranean Dietary Pattern (MDP), assessed by PREDIMED [1]. **Results:** Out of 303 inquired students, 72.7% did not comply with the WHO recommendations for sodium intake and this percentage raised to 82.9% considering sodium density recommendations. Men presented higher sodium intake (median=3132 vs. 2502mg, $p<0.001$) but lower sodium density, despite not reaching statistical significance (1.59 vs. 1.44, $p=0.141$). Physically active students had higher sodium intake than those not physically active (2828 vs. 2480mg, $p=0.011$) but similar sodium density (1.48 vs. 1.59mg, $p=0.702$). Sodium intake was not significantly associated with the field of study ($p=0.922$), even though students attending health-related courses were more prone to have a higher intake (median=2806mg) than those attending exact science courses (2676mg) or other fields (2684mg). We found no significant relationship between adherence to the MDP and sodium density, as well. **Conclusions:** Despite easy access to health information, U.Porto students show little compliance with sodium intake recommendations. Young adults are seldom the target for health prevention programs. Our study shows that they should not be overlooked, and awareness actions should be implemented as early as possible.

Keywords: Sodium Intake, Sodium Density, Mediterranean Dietary Pattern.

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Treatment - a Systematic Review

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Background & Aim: Motivational interviewing (MI) is a patient-centered counseling approach which aims to promote behaviour change by enhancing patient motivation through the exploration and resolution of ambivalence. This type of psychotherapy, initially designed for the treatment of Substance Use Disorders, is now seen as an effective way to manage several health conditions. People with Dual Diagnosis (DD) are complex patients who have a particularly low treatment engagement, so it was hypothesized that MI would be a valuable add-on therapy. This review summarizes the main findings of randomized controlled trials applying MI to patients' psychiatric condition and substance use. We aim to clarify previous inconsistent results regarding MI effectivity in this complex and challenging disorder. **Methods:** A systematic literature search of PubMed, Web of Science and Scopus was performed. The final selection comprised only randomized controlled trials (RCTs) comparing MI alone or integrated in routine care. All patients included were over 16 years old. Studies' quality assessment was conducted with the Jadad Scale. **Results:** We found that intervention groups showed an improvement in functioning [3], psychiatric symptoms [2, 4, 5, 7], medication compliance [7] and substance use [1, 2, 3, 4, 5, 6, 7]. However, this superiority of the intervention was not statistically significant. Number of relapses [1], total days in relapse [3] and alcohol binge days [8] showed a significant improvement in favor of the intervention ($p=0.002$, $p=0.0063$, and $p=0.02$, respectively). **Conclusions:** Most studies failed to detect significant results, although there was a clear improvement in most of these outcomes. The only significant superiority of MI was found related to relapse and alcohol abuse. This disparity may be due to the heterogeneity of the disorder, and/or to methodological limitations. Our findings emphasize the need to carry out more methodically sound RCTs with adaptable characteristics according to the specific pairing of psychiatric disease and substance of abuse.

Keywords: Dual Diagnosis, Motivational Interviewing, Systematic Review, Substance Use, Psychiatric Symptoms, Medication Compliance, Relapse.

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21690 | Using genome-wide CRISPR screens to dissect the molecular mechanisms underlying therapy resistance and sensitivity in HER2-positive gastric cancer

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Gastric cancer (GC) represents a significant global health challenge, ranking as the fifth most common cancer worldwide, and the fourth cause of cancer related death. Due to the absence of significant symptoms in early stages and the lack of screening programs it is commonly diagnosed at an advance stage, where effective treatment options are scarce [1, 2]. GC has a high complexity and can be classified from a morphological, molecular and genetic standpoint. Genetic analysis have revealed specific gene sets defining the primary molecular pathways in GC [3]. However, despite the identification of several targetable genomic alterations in GC, only one, human epidermal growth factor receptor 2 (HER2), has demonstrated predictive value [3, 4]. In GC, HER2 is overexpressed in approximately 20% of patients [5, 6]. HER2-positive GC patients can undergo treatment with HER2 inhibitors, such as trastuzumab. Unfortunately, not all HER2-positive patients respond to trastuzumab. Studies indicate that only 47% of patients benefit from trastuzumab, and a majority of initial responders eventually develop resistance [4, 7]. This project aims to uncover the biology behind the lack of efficacy of anti-HER2 therapies in HER2-positive GC. We hypothesize that there might be genes whose loss may enhance the efficacy of anti HER2 therapy. To test this hypothesis, we have performed genome-wide CRISPR screens; we have identified 4 genes whose loss confers resistance to anti-HER2 therapy and >20 genes whose loss confers sensitivity to HER2 inhibitors, in HER2-amplified GC cell lines. Regarding these results, we are currently performing the validation of the top hits. In conclusion, some the hits that were obtained might be promising biomarkers for HER2 positive GC.

Keywords: Gastric Cancer (GC), HER2, CRISPR Screening.

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21691 | Determinants for breakfast consumption among U.Porto students

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Background & Aim: Transition to university is associated to changes in dietary habits, such as irregular breakfast consumption. Identifying factors related to breakfast consumption is crucial to develop intervention strategies. The aim was to study the determinants of breakfast consumption among U.Porto students. **Methods:** This cross-sectional study involved 421 U.Porto students who completed an online questionnaire: sociodemographic characteristics, self-perceived health, dietary habits (including breakfast consumption), satisfaction with food offerings at the university, distance to the university, and type of residence. **Results:** The majority of students (93.8%) consume breakfast, with similar percentages among women (94.2%) and men (92.5%, $p = 0.625$). Students who had breakfast at home did not differ from the remaining on the time to reach the university (mean = 36.2 min vs. 37.6, $p = 0.581$). No significant relationship was found between perceived health status and breakfast consumption ($p > 0.868$). Likewise, there were no significant differences in consumption based on type of residence ($p > 0.838$). Logistic regression analysis did not identify significant predictors of breakfast consumption. **Conclusions:** The majority of U.Porto students consume breakfast. None of the studied factors predicted its consumption. Considering these results, the consumption of breakfast does not represent a pertinent problem in this specific sample.

Keywords: Breakfast, University, Nutrition, Determinants, Students.

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21703 | Unveiling uterine senescence and its potential role in age-related female fertility decline

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Background & Aim: Nowadays, infertility is a major topic present in public health discussions due to its increased prevalence worldwide. With time, female infertility rates have increased, mainly, because women are delaying childbearing to their late 30s/early 40s, leading to fertility decline, complications during gestation, and a higher demand for assisted reproductive techniques. Uterine alterations have been pointed out as an important contributor, as uterine function is linked with the ability to conceive and carry a healthy pregnancy. Previous data reported uterine alterations in reproductively aged mice (1). Also, using human uterine samples, it was shown an age-related increase in albumin carbonylation (2) and variations in the oxidative status of extracellular matrix proteins. We believe that cellular senescence contributes to uterine alterations, impacting tissue microenvironment and impairing its function. In this project, we aim to evaluate the appearance of senescence-related uterine alterations with increasing age.

Methods: Uterine samples from term-pregnant women with ages between 20 and 41 were homogenized, protein lysates were submitted to western blot analysis for relative quantification of senescence-associated proteins, including markers of nuclear damage and Senescence-associated secretory phenotype (SASP) constituents. **Results:** Currently, our results show a strong and significant positive correlation between nuclear proteins, such as HP1, Lamin B1, and PH2AX, and age. Regarding pro-inflammatory proteins, MCP1 tended to increase with age while IL6 and IL1 β did not change. Also, SASP proteins like MMP3 and PAI1 presented a weak negative correlation with age. **Conclusions:** In the uterus, reproductive ageing courses with increased senescence-associated nuclear alterations reflecting the existence of DNA damage and organelle destabilization. Further analysis is needed to confirm the absence of significant variations in SASP proteins.

Keywords: Uterine Senescence, Female Fertility, Reproductive Ageing.

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21707 | Unravelling the ErbB2 Sugar Code in Gastric Cancer: Construction of a Glycoengineered Cell-based Library

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Background & Aim: Gastric Cancer (GC) presents a high mortality rate and its poor prognosis is mainly due to disease detection in the advanced or metastatic stage. Patients require systemic conventional and targeted therapies and, for the latter, few options are available, one being the trastuzumab (TTZ) monoclonal antibody. GC patients with ErbB2 overexpression, a cell surface receptor that undergoes extensive glycosylation, are eligible to receive TTZ. However, the vast majority experiences molecular resistance^[1, 2]. The aim of this project is to understand if the ErbB2 glycosylation profile tunes TTZ binding and, consequently, its therapeutic efficacy. To do that, we are establishing a glycoengineered cell-based library for the cell surface display of ErbB2 carrying well-defined glycosylation profiles (ErbB2 GlycoDisplay). **Methods:** *In vitro* characterization of the ErbB2 expression and activation levels in a panel of GC cell lines and their glycosylation profile by Western blot (WB) and immunofluorescence (IF), to allow the selection of cell lines for subsequent CRISPR/Cas9-based precise glycoediting^[3]. Selected Cell lines undergo an established pipeline of precise genome editing with previously validated gRNAs; isolation and validation of independent cell clones and, finally, *in vitro* validation of their glycosylation profile by WB and IF. **Results:** Two gastric adenocarcinoma cell lines showing high ErbB2 expression and endogenous activation were selected (NCI-N87 and OE-19) for glycoengineering. Several genomically edited cell line clones were obtained depicting tailored glycosylation profiles, that is, the selective abrogation of pre-determined cancer-associated glycan antigens. Successfully edited glycogenes include ST6GAL1, ST3GAL3 and FUT3. K.O. cell lines depict absent expression of α 2,6- and α 2,3-sialylation and sialyl Lewis a (SLe^a), respectively, from the cell membrane. **Conclusions:** We are setting up a comprehensive cell-based library as an important pre-clinical tool to address glycan-mediated resistance to TTZ in ErbB2-positive GC.

Keywords: Gastric Cancer, Glycosylation, ErbB2, Molecular Resistance.

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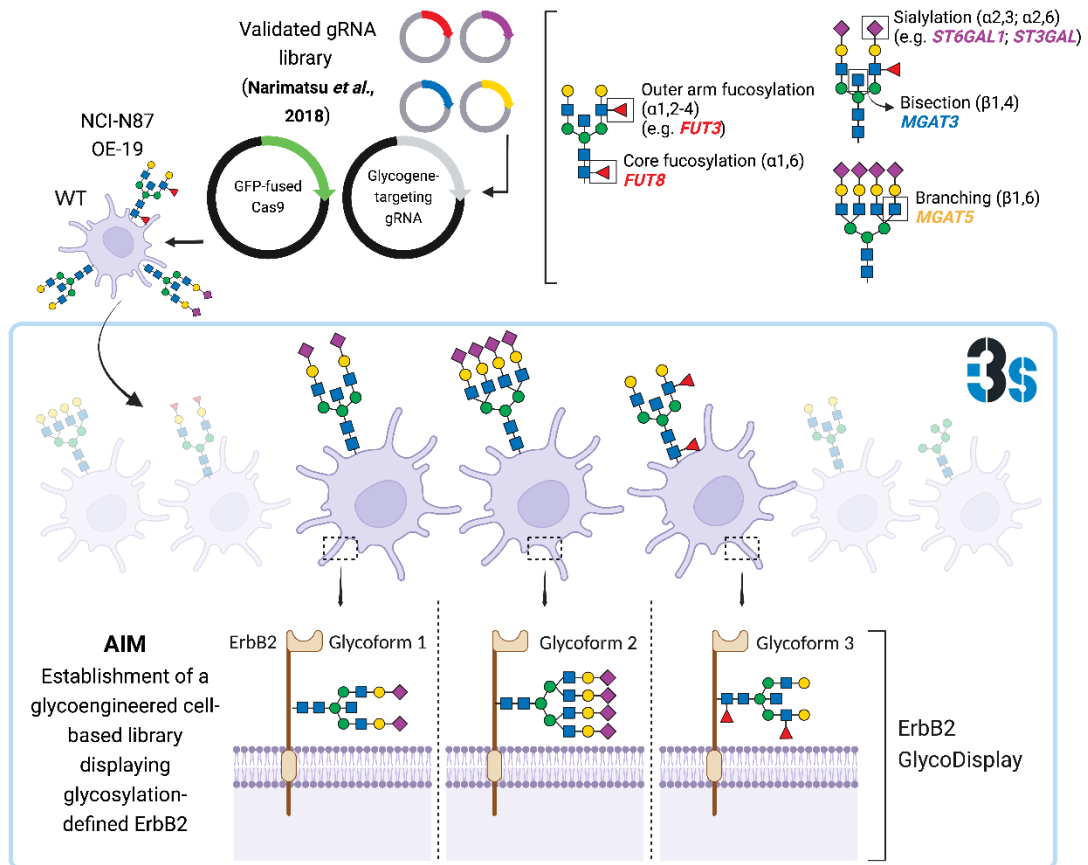


Figure 1: Representation of the scientific strategy to obtain the GlycoDisplay of ErbB2 with the selected cell lines for isolation and validation of independent glycoforms

21716 | The Missing Link between Iron-Induced Reactive Oxygen Species and Protection against Mycobacterial Infections

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Background & Aim: Iron is required for all living beings to ensure several metabolic processes, pathogens are not exception, they compete against the host for iron availability. Mammalians have developed several immunological mechanisms that sequester iron from the infection site, impacting iron distribution during infection [1]. Reactive oxygen species (ROS) are important players: they participate in pathogen clearance in phagocytic cells and act as intracellular signaling molecules [2]. The objective of this work was to link iron redistribution and ROS formation in protection against *Mycobacterium avium*. **Methods:** The experimental plan was divided into two parts: (1) the role of IFN- γ and TNF- α on ROS and iron metabolism and (2) iNOS and FTH1 as important immune players in mycobacterial infection. Using several genetically modified mouse models, *M. avium* chronic infection was characterized mainly through flow cytometry and histological analysis, at 3 and 4 weeks postinfection (p.i.). **Results:** Using the MIIG mouse model (whose macrophages are insensitive to IFN- γ) it was found that, at 3 weeks p.i., IFN- γ signaling on macrophages can be dispensable for the *M. avium* 25291 growth control. This was confirmed by the histological analysis, where it was also observed that the IFN- γ signaling on macrophages was not essential for granuloma assembly. The flow cytometry analysis revealed a high number of CD4⁺ T cells in MIIG⁺ mice, that would imply a higher IFN- γ and TNF- α production to compensate for the absence of IFN- γ -macrophage signaling, which was later confirmed in the serum cytokines' quantification where high levels of TNF- α were detected in MIIG⁺ mice. It was also found that the 3-week p.i. timepoint might be an early stage for *M. avium* infection characterization of *Nos2* $\alpha^{-/-}$ and *Nos2* $\alpha^{-/-}$.*Fth1* $^{-/-}$. **Conclusions:** Many of the results previously obtained by our group were revalidated and CellRox protocol was optimized for ROS detection. Further analysis is needed, mainly regarding a study in *Fth1* $^{-/-}$ mice to access how iron redistribution affects ROS formation.

Keywords: Iron, Reactive oxygen species, mycobacterial infection, immune regulation

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21724 | Deciphering the role of cholesterol in the tumour microenvironment: novel colorectal cell line clustering approach

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Background & Aim: Cholesterol, whose metabolism tends to be dysregulated in colorectal cancer (CRC)¹, has the potential to promote an immunosuppressive tumour microenvironment (TME)². An *in silico* study conducted within our research group found that CRC can be clustered into groups based on the differential expression of several genes involved in cholesterol metabolism. The results also show differences between the clusters regarding the TME, implying that cholesterol may indeed modulate the immune response in the context of CRC. Our aim was to replicate these findings with CRC cell lines, creating a system for studying the immunomodulatory potential of these clusters *in vitro*. **Methods:** RNAseq raw counts from 55 cell lines from the Cancer Cell Line Encyclopedia were downloaded, normalized through EDA Seq normalization, and converted to log₂. Single-sample Gene Set Enrichment Analysis (ssGSEA) was employed to score them according to the expression levels of genes within six curated gene sets (cholesterol biosynthesis, efflux, storage, reverse transport, uptake, and catabolism). The k-means algorithm was used to divide the samples into five distinct clusters. We then explored whether these clusters presented differences regarding genes that could intervene in the modulation of the immune response in the TME, using ssGSEA to compare the clusters regarding several pathways related to immunomodulation. **Results:** We found statistically significant differences between the clusters regarding the expression of genes related to adaptive immune response and, more specifically, antigen processing and presentation, correlating with their cholesterol metabolism. **Conclusions:** Our findings suggest a potential link between cholesterol metabolism and immune modulatory properties of cell lines, which can thus serve as a model for studying the effects of cholesterol in the TME. Further validation studies are underway using cell lines representative of each cluster to confirm these results (Figure 1).

Keywords: Colorectal Cancer, Cholesterol, Tumour Microenvironment, Immunomodulation.

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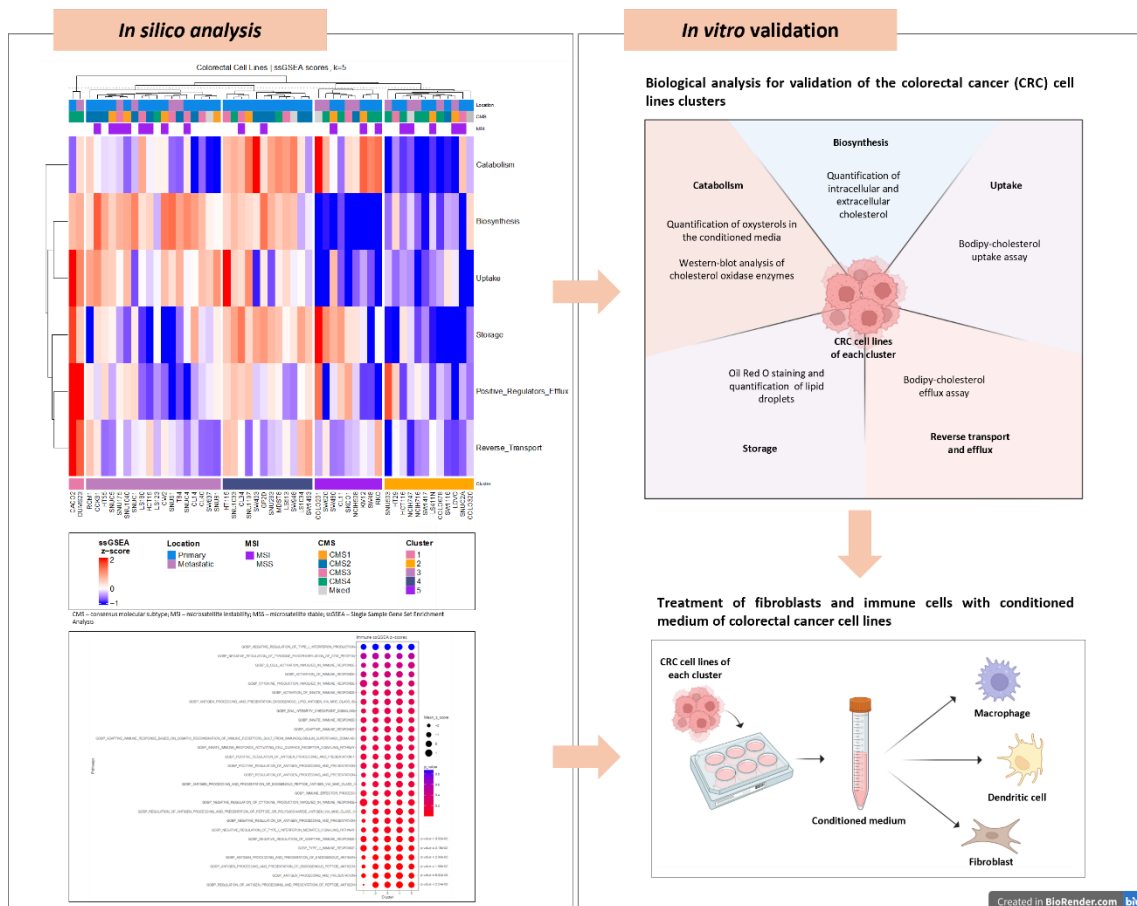


Figure 1: Clustering of colorectal cancer cell lines genetic profiles into cholesterol metabolism subgroups, analysis of immune modulation pathways and overview of the validation process. p-values are presented for the results that show statistically significant differences.

21727 | Incidence rates and mortality caused by oral cancer in firefighters

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Background and Aim: Firefighters (FFs) are exposed to various hazardous pollutants that promote the development of cancer and aggravate pre-existing cardio-respiratory diseases [1-2]. Oral cancer (OC) is a common malignancy among population and FFs may be at increased risk of developing OC due to their occupation [3]. This study aims to characterize the incidence and mortality rates of OC in FFs. **Methods:** A search for studies reporting incidence and mortality of OC in FFs was conducted across several databases (PubMed, Google Scholar, and Web of Science ISI). Only the studies reporting data on cancer in the buccal cavity of FFs were selected. A total of 28 studies published between 1977 and 2023 were selected and included in the analysis. Data was extracted, compiled, and analysed with different statistical tools. **Results:** Published studies characterize FFs from North America, Europe, and Australia. In Europe, the available information is still lacking as FFs from most countries, including Portugal, remain uncharacterized. About 35% of the studies presented increased incidence rates of oral cancer in FFs with standard incidence ratios ranging from 0.14 to 4.10. Additionally, some authors reported increased mortality values with standard mortality ratios ranging from 0.18 to 5.26 in 61.5% of studies. Despite being limited, the available literature suggests an increased risk of developing OC among firefighters. **Conclusions:** More epidemiologic research needs to be conducted, including a higher number of FFs from different geographical regions to explore the relation between firefighting activity and the risk of developing oral cancer.

Keywords: Occupational exposure, Firefighters, Oral Cancer

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21736 | Exploring SSC5D's impact on maternal-fetal infections and neonatal sepsis

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Background & Aim: SSC5D, a member of the scavenger receptor cysteine-rich (SRCR) superfamily, is present in various structures along the mouse urogenital tract [1] and abundantly expressed in the human placenta [2]. SSC5D binds to different bacteria, behaving as a Pathogen Recognition Receptor (PRR). Despite being present in low levels in the serum, these increase significantly during infections and inflammation [2,3,4]. However, SSC5D remains one of the least studied SRCR family members and we here propose to study its role in placenta, particularly in pregnancy-associated infections. **Methods:** Real-time PCR was used to analyze the *Ssc5d* gene expression in mouse placenta at different gestational stages. An SSC5D-knockout (KO) mouse strain was developed to study the role of the protein during normal pregnancy development and upon an infectious challenge. RNA-sequencing was used to identify significant differences in placental gene expression levels between wild-type (WT) and SSC5D-KO samples. WT and SSC5D-KO pregnant mice were vaginally infected with the clinically-relevant Group B Streptococcus (GBS), and the infection burden of the offspring was analyzed. **Results:** *Ssc5d* expression was found to be significantly higher during mouse's early gestational period and RNA-sequencing results showed that the absence of SSC5D led to notable changes in placental gene expression patterns, tissue size, and structure compared to WT mice. SSC5D-KO mice also have significantly reduced embryo weight and litter size. Upon infection, neonates born to GBS-infected SSC5D-KO mothers exhibited increased mortality rates and elevated bacterial burden in the brain, lungs, and liver compared to WT newborns, in which no detectable bacteria were found in these organs. **Conclusions:** These findings demonstrate a novel role for SSC5D in promoting bacterial clearance and inflammation resolution in pregnancy-related infections, positioning this protein as a potential therapeutic candidate to fight neonatal infections.

Keywords: SSC5D, PRR, Placenta, Immune Response, Pregnancy-Associated Infections.

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21737 | Comparative *In Vitro* Cytotoxicity of Synthetic Cathinones and Methamphetamine on Cardiac AC16 Cells

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Background & Aim: Synthetic cathinones are psychoactive derivatives of the natural drug cathinone. They are commonly marketed as safer alternatives to traditional illicit substances. However, an alarming trend has emerged over the years, indicating a rise in fatalities associated with the cardiotoxic effects of synthetic cathinones [1]. Still, few studies address the mechanisms underlying this toxicity. Thus, this work aimed to study the cardiotoxicity of synthetic cathinones (mephedrone, 3,4-DMMC, ethcathinone, and α -PVP) in the AC16 human cardiomyocyte cell line and compare it with methamphetamine toxicity. **Methods:** The human cardiomyocyte cell line AC16 was differentiated using horse serum [2]. After differentiation, the cells were exposed for 48 hours to different concentrations of methamphetamine (1-10 mM), and to the following synthetic cathinones: mephedrone (0.1-10 mM), 3,4-DMMC (0.05-5 mM), ethcathinone (1-10 mM), and α -PVP (0.25-5 mM). After the exposure period, two cytotoxicity tests were carried: the MTT reduction and neutral red uptake assays. **Results:** All the studied cathinones, (mephedrone, 3,4-DMMC, ethcathinone, and α -PVP) as well as methamphetamine presented significant cytotoxicity in differentiated AC16 cells, with its effects escalating proportionally with higher concentrations. In the MTT reduction assay, significant cytotoxicity was observed with 3,4-DMMC at a concentration as low as 0.1 mM, mephedrone at 0.25 mM, α -PVP at 1 mM, while methamphetamine exhibited meaningful toxicity starting at 2.5 mM, and ethcathinone at 5 mM. In general, the results obtained showed that higher concentrations were needed to induce cytotoxicity in the NR uptake assay than in the MTT assay. **Conclusions:** Although synthetic cathinones are sold as safer than methamphetamine, some had an equal or even greater potential to cause cytotoxicity in this cardiac cell model. However, further studies are needed to determine the impact of these cathinones on cellular processes.

Keywords: Cardiotoxicity, Cathinones, Cytotoxicity, AC16 Cells.

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21740 | The cytotoxicity of bortezomib in AC16 cardiac cells and possible therapeutic options involving redox pathways

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Background & Aim: Cancer survivorship rate has witnessed a notable increase, leveraged by amazing therapeutic advancements. However, oncological treatments present important and clinically limiting adverse effects. Bortezomib (BTZ) is a proteasome inhibitor used in multiple myeloma, having its clinical use limited because of its cardiotoxicity. Nuclear factor erythroid 2–related factor 2 (Nrf2) is a transcription factor responsible for redox homeostasis e.g., influencing glutathione (GSH) pathway, among others. Thus, this study aims to investigate the influence of Nrf2 modulators [cheirolin (CH), SK-119, SH-29 and dimethyl fumarate (DMF)] on the cytotoxicity induced by BTZ in human differentiated AC16 cardiac cells. **Methods:** AC16 cells were differentiated with horse serum and then exposed to clinically relevant doses of BTZ (0.01–20 µM) for 24 or 48h, after which two cytotoxicity assays were performed: the MTT reduction and the neutral red uptake assays. Then, two concentrations were chosen (1 and 0.01 µM) to be co-incubated with CH, SK-119, SH-29 and DMF. Furthermore, in the former conditions, the levels of GSH, Nrf2 and p62 were analyzed. **Results:** A time-dependent cytotoxicity was observed for the concentrations tested; however, a concentration- dependent cytotoxicity was only observed for the lowest concentrations tested (0.01 to 0.5 µM). Regarding the cytotoxicity elicited by BTZ, CH (10 µM) proved to be partially protective against the toxicity elicited by BTZ (1 µM). Incubation with BTZ alone led to a reduction in Nrf2 levels, but its co-incubation with CH increased Nrf2 levels, also affecting GSH levels. SK-119 and SH-29 did not induce significant changes. **Conclusions:** The protection conferred by CH against BTZ-induced cytotoxicity appears to be related to its ability to increase overall levels of Nrf2. Therefore, Nrf2 modulation emerges as a potential therapeutic approach for mitigating BTZ-induced cardiotoxicity.

Keywords: Bortezomib, Cardiotoxicity, Nrf2, Oxidative Stress.

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21743 | BABY-SCORE: Decoding Consumer Behaviour in Infant Nutrition Choices

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Background & Aim: Infant nutrition lays the foundation for lifelong health, with compelling evidence linking early dietary patterns to adult well-being. This study aims to incorporate consumer preferences into the development of the BABY-SCORE algorithm for infant nutrition, aligning it with both nutritional and sustainability considerations. The research aims to investigate consumer behaviour regarding infant food choices. **Methods:** An online questionnaire was directed at parents, grandparents, or caregivers of infants aged 6 to 12 months. Out of the surveyed consumers, 73 willingly participated, comprising 67.1% women and 32.9% men, with ages ranging from 20 to 85 years and a mean age of 35 years. Emphasis was placed on formulating clear and concise questions, covering aspects such as the frequency of infant food purchases, drivers behind these choices, and characterization of infant food product consumption. The survey guaranteed anonymity, and participation was voluntary. **Results:** Our findings underscore the importance of economic factors and children's preferences in shaping decisions regarding infant food choices. The most influential factors identified were price, promotion, and children's preferences, ranking as the top three considerations. Interestingly, nutritional aspects such as healthcare professionals' recommendations, nutrition facts labels, ingredient lists, and sugar content were rated lower in importance by surveyed consumers. **Conclusions:** The findings highlight a significant demand for accessible nutritional information, emphasizing the necessity of empowering consumers with the knowledge needed to make healthier choices. The BABY-SCORE project directly addresses this gap, contributing significantly to empowering consumers to make healthier and sustainable infant nutrition choices.

Keywords: Infant Food, Consumer Behaviour, Sustainability, Nutrition, Health.

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21752 | Characterization of a Cell Model with a Mitochondrial DNA Mutation and Evaluation of Novel Therapeutic Strategies for Mitochondrial Diseases

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Background & Aim: Mitophagy, the autophagic degradation of mitochondria, ensures a healthy mitochondrial pool. The ratio of mutant to healthy mitochondrial DNA (mtDNA) strongly influences the severity of mitochondrial diseases. We hypothesize that inhibiting the mitochondrial deubiquitinase USP30, which removes ubiquitin molecules tagging mitochondria for degradation, could promote mitophagy and reduce the mutant mtDNA load. Thus, we characterized a cell model with the m.8993T>G mtDNA mutation, which affects the ATP synthase and causes NARP syndrome, and investigated if pharmacological USP30 inhibition induces mitophagy and reduces mutant mtDNA load in this model. **Methods:** We treated 143B cybrid cells, presenting either wild-type mtDNA or the m.8993T>G mtDNA mutation, with the USP30 inhibitor MF-094 or solvent control. We assessed cellular phenotype (proliferation, resazurin metabolism, ATP/ADP levels and extracellular acidification) under glycolytic and oxidative phosphorylation (OXPHOS)-dependent conditions (glucose vs. galactose media), MF-094 bioactivity (TOM-20 ubiquitination and mitolysosome formation) and mutant mtDNA load. **Results:** Under OXPHOS-dependent conditions, mutant cells displayed reduced cell proliferation and ATP/ADP ratio when compared to wild-type cells. Under glycolytic conditions: mitochondrial inhibitors (rotenone, myxothiazol, antimycin and oligomycin) decreased resazurin metabolism in wild-type cells, but not in mutant cells; and mutant cells acidified the extracellular medium more than wild-type cells. Treatment with MF-094 enhanced TOM-20 ubiquitination and mitolysosome numbers; however, after 6-weeks of treatments the mutant mtDNA load remained unaltered. **Conclusions:** Cells bearing m.8993T>G mutation presented reduced mitochondrial activity and reliance on glycolysis. Despite promoting mitophagy, MF-094 failed to reduce mutant mtDNA load, highlighting the need for exploring alternative strategies to achieve an effective reduction of mutant mtDNA load.

Keywords: Mitochondria, Mitophagy, Deubiquitinase, Pharmacological Strategy, Cell Model.

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21762 | Characterization of zebrafish model with thyroid-targeted BRAFV600E overexpression

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Background & Aim: The human thyroid cancer was ranked as the 7th most frequent in GLOBOCAN 2022 with 821 214 new cases worldwide (IARC WHO, 2024). Papillary Thyroid Carcinoma (PTC) stands as the most prevalent histotype, marked by the *BRAF*^{V600E} mutation as its predominant genetic alteration (Baloch, et al., 2022). **Methods:** Our team developed a zebrafish model expressing the human *BRAF*^{V600E} mutation in the thyroid follicular cells, which also retains the hypothalamus–pituitary–thyroid axis. Additionally knowing the importance of the tp53 mutation in tumorigenesis, we developed another *BRAF*^{V600E} transgenic fish with a tp53 mutant background (*tp53*^{M214K}). With this work, we aimed to better understand the impact of the *BRAF*^{V600E} mutation on thyroid disease. To achieve our aim, so far, we performed thyroid extraction of 3 months *post* fertilization zebrafish and performed RNA extraction for the quantification of mRNA levels of key differentiation thyroid factors: thyroglobulin (tg), nis (slc5a5) and pax8. Additionally, we performed a preliminary morphological quantification of the thyroid histological section of the transgenic fishes. All experiments were performed on four different genotypes: Control; *BRAF*^{V600E}, *tp53*^{M214K} and *BRAF*^{V600E}*tp53*^{M214K}. **Results:** The mRNA quantification results for *BRAF*^{V600E} revealed a significant upregulation of NIS mRNA expression ($p < 0.05$) compared to the control. Conversely, *BRAF*^{V600E}*tp53*^{M214K} zebrafish exhibited a reversal in NIS mRNA expression accompanied by a significant decrease in tg mRNA expression ($p < 0.05$). The preliminary morphometric analysis of the zebrafish revealed a lower number of thyroid follicles, reduced thyroid follicular area, and reduced average follicle size in both BRAF models (*BRAF*^{V600E} and *BRAF*^{V600E}*tp53*^{M214K}) when compared with the respective controls ($p < 0.01$). **Conclusions:** Overall, our *BRAF*^{V600E} transgenic line is an exciting new model to understand *BRAF*^{V600E}-dependent thyroid disease and the role of tp53 mutation in this genetic context.

Keywords: Transgenic, Zebrafish, Thyroid, BRAF^{V600E}

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21787 | Unveiling Nature's Antibiotic Arsenal: The Antimicrobial activity of a Soil-Derived bacterial Isolate

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Background & Aim: Antimicrobial resistance (AMR) stands as a paramount public health concern exacerbated by shortage of novel antimicrobials. Recognizing the significance of soil microorganisms as primary antibiotic producers and understanding that addressing this challenge necessitates collaborative efforts among communities and research teams, initiatives like MicroMundo@UPorto were established. In the context of this project, which involves searching for antibiotic-producing bacteria in the soil, a *Pseudomonas* isolate with antimicrobial activity was found. The aim of this work was to explore this strain's antibacterial properties.

Methods: Genome annotation was performed by RAST server and species identification was conducted using the platform TYGS for dDDH as well as comparisons based on ANI using JSpecies webserver and *Pseudomonas* species type strains. Antibiosis assays were performed against a panel of clinical and commensal isolates of *Escherichia coli* (n=11), *Klebsiella pneumoniae* (n=11), *Proteus mirabilis* (n=1), *Pseudomonas aeruginosa* (n=2), *Acinetobacter* spp. (n=5), *Enterococcus* spp. (n=6), *Streptococcus agalactiae* (n=9) and *Staphylococcus epidermidis* (n=1). **Results:** Genomic analysis revealed that the isolate most probably belongs to a putative novel *Pseudomonas* species. RAST annotation revealed the presence of genes associated with the metabolism of aromatic compounds, and genes involved in the synthesis of fatty acids that could be involved in the antimicrobial activity observed. The isolate demonstrated activity against all tested strains of *E. coli*, *Proteus*, *Enterococcus*, and *S. epidermidis*. However, it only exhibited activity against certain clones of *K. pneumoniae* (including an NDM-1 producer) and some strains of *S. agalactiae*, and no activity against *P. aeruginosa* and *Acinetobacter*. **Conclusions:** This work not only emphasized the significance of soil microorganisms as sources of novel antimicrobial compounds but also underscored the role of Citizen Science in combating AMR.

Keywords: Antimicrobial Resistance, Antibiotic, Soil, *Pseudomonas*.

21819 | Development and validation of an analytical method to assess the importance of using gauze dressings in luer-lock connection systems during the preparation of cytotoxic drugs

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Background & Aim: Healthcare professionals face occupational hazardous when handling cytotoxic drugs used for cancer treatment [1]. The International Society of Oncology Pharmacy Practice (ISOPP) standards [2] are the guidelines recommended by the European Parliament for safety procedures but, unlike others (e.g. Occupational Safety and Health Administration (OSHA)) [3], fail to mention the need to use dressings at luer-lock connections to contain cytotoxic leaks. This study aims to develop and validate an analytical method capable of identifying and quantifying cyclophosphamide (CP) and 5-fluorouracil (5-FU) in gauze dressings. **Methods:** Gauze dressings (20x10 cm) containing varying concentrations of CP and 5-FU were placed in 15 mL falcons containing acetonitrile:methanol:water (19:13:68). After stirring, the samples were passed through a 0.22 µm filter. The extracted samples were then analyzed using HPLC-DAD, equipped with a C18 column (Hypersil Gold™ 150mm x 4.6mm and 5µm particle size). The mobile phases employed were acetonitrile:methanol:water (19:13:68) (CP) and 0.5% acetic acid in water (5-FU) and detection was set at 205 nm (CP) and 260 nm (5-FU). **Results:** The mean of five calibration curves generated for each drug were calculated, each exhibiting $R^2 > 0.997$, thus confirming the linearity for both drugs. Regarding sensitivity, LOD of 0.006 µg/cm² for 5-FU and 0.11 µg/cm² for CP and LOQs of 0.02 µg/cm² for 5-FU and 0.32 µg/cm² for CP, were obtained. Accuracy fell within the range of 93%-110% and precision was set between 91% and 99%. At room temperature, gauze dressings deliberately contaminated exhibited superior stability for 5-FU compared to CP. **Conclusions:** The method has been successfully validated and, once suitability is confirmed, it will be applicable for the evaluation of the importance of using gauze dressing when handling cytotoxic drugs, by testing contaminations occurring during real-life routine handling of these cytotoxic drugs.

Keywords: Cytotoxic Drugs, Occupational Hazardous, Chemotherapy, HPLC-DAD.

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21846 | Using CRISPR/Cas9 to “correct” patient-derived induced pluripotent stem cells: a story of novelty and challenges in the context of a rare genetic disorder

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Background & Aim: CRISPR/Cas9 technology enables targeted genetic engineering of cells and organisms. Its components include a Cas9 protein, that cuts the DNA double strand at a precise site defined by a Protospacer Adjacent Motif (PAM), and a single guideRNA (sgRNA) that has part of its sequence complementary to the target DNA adjacent to the PAM, and the other part binding to Cas9. Together, Cas9 and sgRNA act in a ribonucleoprotein complex (RNP). To insert specific sequences, a DNA donor is provided as template for Homology Directed Repair (1). Induced pluripotent stem cells (iPSCs) are broadly used patient-derived disease models that can be edited by CRISPR/Cas9 to replace the pathogenic variant by the wildtype (wt), originating isogenic lines (2,3) that can be used as genetic background controls or potentially for autologous transplants. Thus, we aim to create an isogenic CRISPR-WT-iPSC line for a rare genetic disorder, Mucopolysaccharidosis type II (MPS II), caused by mutations in *GNPTAB* gene (4). **Methods:** Bioinformatic tools were used to design a sgRNA and a single strand DNA template containing the wt sequence. Transfection using lipofectamine and electroporation were tested to deliver the CRISPR components into iPSCs. An EGFP plasmid was used as control. After 72 hours, cells were lysed and sgRNA efficiency was determined by Sanger Sequencing. **Results:** No *GNPTAB* edition was found either using lipofectamine or electroporation. However, although iPSCs are known to be hard to transfect cells, EGFP plasmid was efficiently delivered. Thus, the lack of efficiency seems to be due to the chosen sgRNA. Indeed, the bioinformatic scores had predicted a low efficiency for this sgRNA, but we privileged PAM proximity and off-target score. Now, we designed new sgRNAs with higher efficiency scores but more distant to the mutation, which we will test soon. **Conclusions:** We demonstrated some of the difficulties in using CRISPR/Cas9, namely finding PAMs in close proximity to editing site and efficient sgRNAs.

Keywords: CRISPR/Cas9, iPSCs, Disease Models, Rare Diseases.

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21863 | A non-integrating virus-free method for the generation of CAR-expressing recombinant NK cells for cancer immunotherapy

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Background & Aim: The development of CAR-modified cell therapy marks a groundbreaking advancement in cancer therapy, achieving unprecedented clinical efficacy in several types of haematological cancer. However, most conventional methods of CAR-modified cell generation rely on lentiviral transduction, which bears the risk of functional impairment of the host cell and oncogenesis. Thus, this work focuses on a novel type of non-viral and non-integrating vectors, consisting of DNA plasmids that have been engineered to allow persistent modification of eukaryotic cells – S/MAR Nanovectors. Importantly, this method has been recently used to successfully engineer CAR-T cells [1]. The aim of this project was thus to use these vectors for CAR modification of another relevant immune cell type - NK cells. Modification of the NK-92 cell line was pursued as a starting point, as NK-92 cells have been clinically proven safe as a cancer therapeutic. **Methods:** S/MAR Nanovector plasmids expressing either a reporter or CAR gene were cloned in modified *E. coli*, first tested in the Jurkat-76 cell line and then used to electroporate NK-92 cells. DNA sensing inhibitors were used prior to electroporation to improve transfection efficiencies. Transgene expression was followed by flow cytometry and positive cells enriched via antibiotic selection. A first assessment on transfection efficiency was also conducted in human PBMC-derived NK cells upon feeder cell expansion. **Results:** A stable CAR-NK-92 cell line could be obtained when cells were pre-treated with the cytosolic DNA sensing inhibitor BX795 before electroporation and selected with puromycin afterwards. Furthermore, primary NKs were shown to be modified with S/MAR vectors, achieving 10.7% reporter-gene positive cells 48 hours post-transfection in a pilot experiment. **Conclusions:** This work demonstrates the feasibility of S/MAR vectors for CAR-NK cell generation and provides a first step towards a safer method to permanently modify NK cells for cancer immunotherapy.

Keywords: Chimeric Antigen Receptor (CAR), Natural Killer (NK) Cells, NK-92 Cell Line, Scaffold/Matrix Attachment Region (S/MAR).

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Actinobacteria for Alzheimer therapies

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Background & Aim: Alzheimer’s disease remains as the most common cause of dementia, accounting for an estimated 60% to 80% of cases [1]. However, effective treatment for this neurodegenerative disease has yet to be found. Actinobacteria are gram-positive bacteria, highly promising in terms of biotechnological potential, with the major part of naturally derived antibiotics and other clinically important molecules being isolated from these microorganisms [3]. Terrestrial actinobacteria are extensively explored, but marine environments are yet poorly investigated in terms of these valuable microbial resources [2]. In this work, the crude extracts of several actinobacterial strains previously isolated from marine macroalgae and deep-sea samples were screened in order to investigate possible bioactive metabolites with anti-Alzheimer potential. **Methods:** Anti-Alzheimer activity was investigated by screening the potential of actinobacterial extracts to inhibit enzymes involved in the pathogenesis of Alzheimer’s disease, namely acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE) [4], [5]. The percentage of inhibition of these enzymes was evaluated by performing an adapted protocol of Ellman’s colorimetric method using 96-welled microplates [6]. **Results:** After performing the assays above, a selected group of the actinobacterial strains demonstrated some degree of inhibition in both AChE and BuChE (above 30%) at a concentration of 2 mg/mL in each well. **Conclusions:** This study shows that actinobacteria can be a source of new therapies for tackling Alzheimer’s disease. One of the crucial aspects of how these bacteria could be beneficial to treat Alzheimer’s disease is related to cholinesterase inhibition, as some of the actinobacterial strains showed some degree of inhibition of this enzyme. Nonetheless, further research is needed, mainly the evaluation of the cytotoxic effect of the extracts in neuroblastoma cells.

Keywords: Actinobacteria, Alzheimer’s Disease, Potential Therapy, Cholinesterase Inhibition.

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21889 | Effects of oral methylphenidate on brain GAP43 and PSD95 proteins in childhood Wistar Kyoto rats

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Background & Aim: Attention Deficit Hyperactivity Disorder (ADHD) is a prevalent neuropsychiatric disorder in childhood and adolescence (1). Differences in brain structure, function, and connectivity are seen between ADHD and healthy individuals (2, 3), but the underlying cellular and neurobiological mechanisms of ADHD are not fully understood (3, 4). Thus, this study aimed to evaluate how clinically relevant oral doses of methylphenidate (MPH), a first-line ADHD treatment, affect body growth and the expression of brain proteins involved in synaptic plasticity, integrity, and neuronal growth. **Methods:** Wistar-Kyoto rats (18 males and 19 females) were randomly assigned to two groups. The treated group received a daily dose of MPH (5mg/kg in a 5% sucrose solution) by gavage, while the control group received an equivalent volume of 5% sucrose solution (5). Administration began on postnatal day 15 (equivalent to childhood in humans) and lasted 15 days, with the doses adjusted individually based on the animal's weight (25g per 100 μ L of drug or vehicle). The animal's weight was monitored throughout the experiment. On postnatal day 30, the animals were sacrificed, and the brain was removed, and several areas were dissected, along with peripheral organs (liver, heart, and kidneys). **Results:** No statistically significant changes in body and peripheral organ weight were noticed among the control and treated groups. Furthermore, MPH did not affect the expression of GAP43 and PSD95 proteins in the diencephalon, as assessed by Western Blotting. Moreover, no notable sex differences were observed for these same parameters, either in the control group or in the treated group. **Conclusions:** Although there are no variations after MPH were seen in males or females, neither sex differences, new brain areas and markers, and mainly models more resembling ADHD need to be tested to ascertain the role of MPH on development.

Keywords: Attention Deficit Hyperactivity Disorder (ADHD), Methylphenidate (MPH), Neuroplasticity, Wistar-Kyoto.

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21895 | The counteracting effect of chrysin on dietary fructose-induced hepatic injury in the rat

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Background & Aim: Metabolic syndrome (MS) incorporates an array of conditions related to metabolic disruption such as insulin resistance, hypertension, non-alcoholic fatty liver disease (NAFLD), high cholesterol levels, cardiovascular disease, and excessive abdominal adiposity [1]. Its presence has been increasing, associated with an exponential growth in obesity worldwide, particularly in developing countries amongst low-income households [2]. Thus, there is an increasing need for affordable interventions applicable to a population with less resources. Chrysin is a polyphenol found in an array of natural sources such as propolis [3]. This project explores the effect of chrysin on counteracting hepatic dysfunction in rats expressing metabolic syndrome-associated conditions. **Methods:** The study included 24 rats fed a standard chow diet and separated in 4 groups, treated for 18 weeks: the Control group (tap water), the Fructose group (water with 10% fructose), the Chrysin group (a daily dose of chrysin (100 mg/kg, p.o.) and the Fructose + Chrysin group (water with 10% fructose + a daily dose of chrysin (100 mg/kg, p.o.)). Quantitative histological analysis was performed on liver tissue to determine hepatic lipid storage (Oil red O) and glycogen storage (Periodic Acid-Schiff). Additionally, a NAFLD activity score (NAS), combining the degree of hepatic steatosis, lobular inflammation, and hepatocyte ballooning, was calculated. **Results:** Fructose ingestion induced an increase in hepatic lipid and glycogen storage. The addition of chrysin both to the standard and to the high fructose-diet caused a significant decrease in hepatic lipid storage. Glycogen hepatic storage was diminished by chrysin in rats on a high-fructose diet. The NAS score was markedly improved by chrysin, both in the absence and presence of a high-fructose diet. **Conclusions:** Our results show that chrysin has a beneficial effect on hepatic lipid and glycogen accumulation in rats expressing metabolic syndrome-associated conditions.

Keywords: Chrysin, Metabolic Syndrome, Fructose, Hepatic Health.

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21896 | Influence of body mass index on liver enzymes, from adolescence to adulthood

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Background & Aim: Childhood obesity is rising worldwide, and Portugal has particularly high rates of obesity and overweight individuals. Obesity increases the risk of liver damage. We aimed to evaluate how body mass index (BMI) from adolescence to adulthood influence the serum levels of liver enzymes (ALT, AST and GGT) in adulthood. **Methods:** Within the EPITeen cohort, 2198 teenagers were observed over time at ages 13, 17, 21, 24, and 27. Data were collected by questionnaires, along with a physical examination comprising anthropometric measurements and blood sample collections. Considering that we have four measurements in time of the outcome, we used linear mixed effects model with random intercept to measure the association between the BMI at moment assessment and [lag] previous BMI and [lag] trend of liver enzyme. Fixed coefficients and the respective confidence intervals were used to assess the association. **Results:** We found that previous BMI was positive and significantly associate with enzyme levels (ALT 0.055; 95%CI:0.049–0.677; AST 0.015; 95%CI:0.011–0.019; GGT 0.026; 95%CI:0.021–0.031) and considering BMI at the moment of enzymes evaluation the association was stronger (ALT 0.083; 95%CI:0.076–0.086; AST 0.021; 95%CI:0.017–0.026; GGT 0.053; 95%CI:0.047–0.059). Although, BMI in the past turns into negative association when interact with current BMI and trend of liver enzyme. Regarding the trend of liver enzymes, higher values over time were associated with higher values at 27 years (ALT 0.647; 95%CI:0.617–0.677; AST 0.589; 95%CI:0.558–0.620; GGT 0.919; 95%CI:0.896–0.942), and this association were stronger than BMI. **Conclusions:** Our study show an increase in liver enzymes with increased levels of BMI, and although some accumulation effect the BMI in the moment of enzymes evaluation was a strong effect. This result suggests that there should be a high level of suspicion for screening and monitoring liver biochemical parameters, in overweight/obese adolescents.

Keywords: Liver Enzymes, Adolescents, Young Adults, Body Mass Index, Cohort Study.

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21910 | Prenatal Findings in 22q11.2 Microduplication Syndrome: a retrospective analysis of 8 cases and review of the literature

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Background & Aim: The 22q11.2 duplication syndrome has been poorly reported in the literature, particularly in the prenatal period, and its pathological significance remains uncertain. The aim of our study was to characterize prenatal findings in fetuses with 22q11.2 microduplication syndrome and explore their outcomes. **Methods:** In this study we report 8 fetuses with 22q11.2 microduplication identified through prenatal genetic testing between 2020 and 2023 in ULS São João and ULS Gaia/Espinho. Prenatal ultrasound results, autopsy findings, inheritance of the microduplications, and their effects on the pregnancy outcome were examined and compared to existing literature. This study was approved by the Ethical Committee of ULS São João and Gaia/Espinho. **Results:** We report eight cases of 22q11.2 microduplication identified by prenatal aCGH testing, with increased nuchal translucency as the primary indication in four cases. Other relevant findings were microcephaly and with intra-uterine growth restriction in one case, and bilateral ventriculomegaly in another. Inheritance patterns included maternal or paternal transmission (6 cases), *de novo* occurrence (1 case), and unknown origin (1 case). Termination of pregnancy was performed in three cases revealing musculoskeletal and craniofacial anomalies and the other five cases were live-born. Postnatal follow-up revealed diverse phenotypes ranging from healthy children with adequate growth pattern and minor phenotypic alterations (n=3), a child with poor growth, dolichocephaly and hip dysplasia, and a child with psychomotor delay. Two cases had history of low schooling and learning difficulties in the carriers of the microduplication. **Conclusions:** Our research contributes for a better characterization of 22q11.2 duplication syndrome. The study emphasizes the importance of considering the variable expressivity and incomplete penetrance associated with this microduplication, highlighting the need for comprehensive prenatal genetic counselling.

Keywords: Copy Number Variations, Array Comparative Genomic Hybridization, 22q11.2 Deletion Syndrome Region, 22q11.2 Duplication Syndrome.

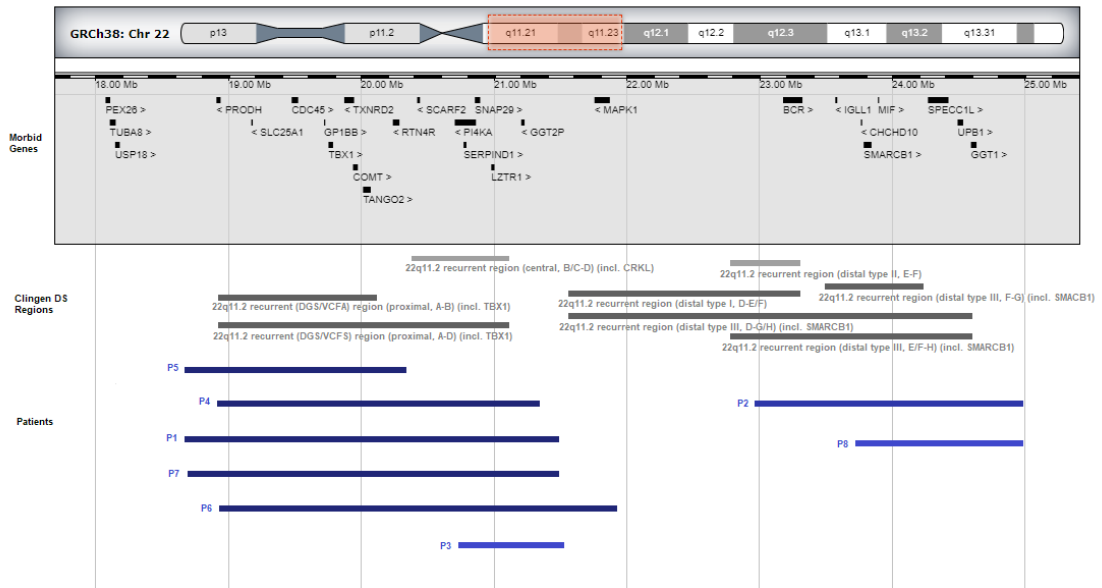


Figure 1: Schematic representation of the 8 cases included in this study in chromosome 22q11.2 region.

21918 | Optimal Trajectory of Neuroendoscope for Third Ventricle Pavement Access

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Background & Aim: Endoscopic Third Ventriculostomy (ETV) is a surgical procedure used to treat hydrocephalus, a condition characterized by an abnormal accumulation of cerebrospinal fluid in the ventricles of the brain. This study seeks to establish a standardized and safe approach for Free-Hand ETV by defining a new pathway and craniometric point. This procedure is used in settings where the equipment for fixed or robotic-assisted surgery is unavailable or in specific emergency scenarios, including acute hydrocephalus or a sudden worsening of the condition that poses an immediate risk to the life of the patient. **Methods:** 187 MRIs were examined, of which 30 had hydrocephalus. A pathway crossing the cranial bone, foramen of Monro, and tuber cinereum was outlined. The entry point location relative to cranial sutures, pathway angulations, depth, and distances to key anatomical landmarks were measured. Comparisons were made between hydrocephalic and non-hydrocephalic patients, with assessments of variations linked to age, sex, and Evan's index. **Results:** Significant differences in various surgical parameters were noted between hydrocephalic and non-hydrocephalic patients. Hydrocephalic patients had greater mean neuroendoscope depth (93.520 ± 7.228 mm), lateral angulation ($10.982 \pm 6.119^\circ$), and mean distance to the sagittal suture (18.957 ± 8.608 mm), but a smaller median distance to the superior frontal sulcus. Other variables showed no significant differences, with an overall mean of $2.287 \pm 3.417^\circ$ for posterior angulation and a distance to the precentral sulcus of 18.230 ± 7.453 mm. **Conclusions:** By delineating a novel pathway and craniometric point, the study offers a promising path for the urgent care of hydrocephalus. The new craniometric point is strategically positioned near both coronal and sagittal sutures while ensuring a safe distance from the precentral and superior frontal sulci. This approach holds the potential to improve surgical precision and patient outcomes in the management of hydrocephalus.

Keywords: Third Ventricle, Neuroanatomy, Endoscopic Third Ventriculostomy, Hydrocephalus, Neurosurgery.

21924 | The impact of Alzheimer's disease on the family/caregiver: The role of using supports on burden and satisfaction

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Background & Aim: Caring for family members with Alzheimer's disease can represent a substantial burden, both physically and emotionally. Thus, receiving support for, and assistance with these situations could be a fundamental help for caregivers. The goal of this study was to inspect the role of using supports, or assistance, in the satisfaction and in the burden of caregivers of patients with Alzheimer's disease. **Methods:** A total of 43 caregivers of patients with Alzheimer's disease participated in this study, responding to questions on their use of supports/assistance, satisfaction, and the Caregiver Burden Inventory. Statistical analyses included t-tests and univariate general linear models. **Results:** Only 16 (37.2%) caregivers reported receiving assistance. No statistically significant difference was found in satisfaction, between those who received and those who did not receive assistance. In the adjusted model, not using supports was associated with greater emotional burden ($p = 0.029$), whereas using supports was associated with increased time-dependent burden. **Conclusions:** The results emphasize the significance of support and assistance in alleviating the emotional burden experienced by caregivers of Alzheimer's disease patients.

Keywords: Caregiver, Alzheimer's Disease, Supports, Assistance.

21927 | The effect of pre-surgery clinical communication on bariatric surgery

outcomes: a prospective study

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Background & Aim: Although, research shows that a positive doctor-patient relationship plays an important role in patient outcomes, the influence of their communication during the pre-surgery preparatory consultation (PS) for Bariatric Surgery (BS) remains unclear. The goal of this study was to inspect the association between patients' perceptions of doctor-patient communication (DPC) in the PS for BS and the results of the BS. **Methods:** In this prospective cross-sectional study, participants ($n=89$, age ≥ 18 years) were all the patients who underwent BS at the Hospital São João between October of 2023 and January of 2024. Before the surgery, patients' perspectives regarding DPC and anxiety levels during that PS were assessed with the Communication Assessment Tool (CAT) and the State-Trait Anxiety Inventory Form Y (STAI-Y), respectively. One month after the surgery, participants' levels of well-being were assessed through the 36-Item Short Form Survey (SF-36). Clinical data were obtained through patients' electronic records. Data were analyzed with regression models. **Results:** In the adjusted models, associations ($p < 0.05$) were found for the following outcomes: patient well-being, particularly bodily pain and social functioning, weight loss, and BMI decrease. **Conclusions:** There is a positive effect of DPC on the results of BS, regarding better patient perception of physician support, higher weight loss, higher BMI decrease and a positive effect on the emotional and physical component of participants' well-being. However, these results may not be generalized and more studies are necessary to strengthen these findings.

Keywords: Communication Assessment Tool, Bariatric Surgery, Doctor-patient relationship, Patient clinical outcomes.

21930 | Understanding the impact of glycosylation with Heparan Sulfate on the activity of Receptor Tyrosine Kinase in cancer

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Background & Aim: Changes in cellular glycosylation patterns have emerged as a common feature of tumour cells [1]. Heparan sulfate proteoglycans (HSPGs) are important cellular components with key roles in homeostasis through their interactions with several biologically relevant ligands [2]. In cancer, particularly in gastric cancer, HS glycan chains and their structural modifications have been implicated in disease progression [3-5]. However, the mechanism behind their role in tumour biology remains poorly understood. The HS-ligand interactions support the functional role of HS chains in the regulation of the Receptor Tyrosine Kinase (RTK) activation, giving this underexplored mechanism significant relevance. This work aims to evaluate the functional impact of different HS/HSPGs expression profiles on RTK activation, tumour cells phenotype and, ultimately, therapy resistance. **Methods:** HS/HSPG expression profiles were analyzed in gastric cancer cell lines and validated by immunofluorescence in tumour samples. Gastric cancer cell lines were genetically glycoengineered to express distinct HS/HSPG signatures. The expression and activity of RTKs was assessed before and after ligand stimulatory assays. Immunoprecipitation and mass spectrometry analysis will be conducted to assess the RTKs' molecular partners. **Results:** Different gastric cancer cell lines exhibit distinct HS signatures, implying the presence of many HS carriers in the tumoural context. SDC4 and SDC1 are two main HS carriers in gastric cancer. Moreover, gastric carcinomas show altered expression of SDC4 and SDC1. EGFR, HER2, c-MET and RON expression and modulation in cellular models with different HS profiles is currently being evaluated. **Conclusions:** Our results disclose the expression profiles of HS and its carriers in gastric cancer. The understanding of HS-RTKs interactions on tumour cells surface emerges as a crucial element for understanding the receptor activation in an oncological context, as well as targeted therapy resistance.

Keywords: Glycosaminoglycans, Heparan Sulfate, Receptor Tyrosine Kinase, Gastric Cancer.

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21941 | Sarcopenia in an Internal Medicine department and the relationship with the adherence to a Mediterranean dietary pattern

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Background & Aim: Sarcopenia, a skeletal muscle disorder has personal and socioeconomic impact⁽¹⁾. The Mediterranean Diet is typical of the countries surrounding or influenced by the Mediterranean Sea. It is based on sociogeographical, cultural and sustainable elements. Adherence to it seems to contribute to greater longevity, reduced morbidity and mortality⁽²⁻⁴⁾. We aimed to study the possible relation between the prevalence of sarcopenia and adherence to the Mediterranean diet in the internal medicine department. **Methods:** We studied sarcopenia by handgrip strength(HGS)(Gripwise[®]), mid-arm muscle circumference(MAMC)⁽⁵⁾ and calf-circumference(CC); adherence to Mediterranean Diet(MD) by PREvención Dieta MEDiterránea(PREDIMED)^(6, 7). Weight, height, Body Mass Index(BMI)⁽⁸⁾, fat and muscle mass using skinfolds(Lipowise[®]) were assessed. **Results:** 70 women and 92 men admitted in internal medicine service were included, on average aged 81 and 76, BMI 27.4 and 25.1kg/m², body fat(BF) 33.9 and 22.3%, MAMC 19.2 and 21.9cm, CC 31.9 and 32.2cm and HGS 8.5 and 18.3kgF, respectively. PREDIMED averaged score was 10 points for both genders. Using HGS, MAMC and CC, we found that respectively 91.4%, 44.4%, 36.6% had suggestive values of sarcopenia. By PREDIMED we concluded that 64,4% had good adherence to MD. A negative correlation was found between HGS(rs= -0.054;p=0.592) and MAMC(rs= -0.016;p=0.872) and PREDIMED score and there was a positive correlation between CC and PREDIMED score (rs=0.161; p=0.110). The correlations were not significant when comparing all variables and adherence to MD, and it appeared to be different between genders. There was also a positive correlation between BF and PREDIMED score (rs=0.001;p=0.989), however it was not significant. **Conclusions:** We conclude that, patients with higher HGS and MAMC may have lower PREDIMED score probably since these people have higher weight which might suggest a lower adherence to healthy eating habits, like MD. Higher CC and BF were associated with higher PREDIMED score.

Keywords: Sarcopenia, Mediterranean Diet, Nutritional Status.

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21945 | Establishing and characterizing a novel gemcitabine-resistant pancreatic cancer cell line

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Background & Aim: Pancreatic ductal adenocarcinoma (PDAC) is the most prevalent form of pancreatic cancer, accounting for more than 95% of the cases, with a 5-year survival rate of only 6%. Gemcitabine (GEM)-based chemotherapy is currently the standard treatment for advanced PDAC. However, chemotherapy resistance is remarkably common, leading to tumour progression. Although the approved FOLFIRINOX regimen was proved to prompt increased overall survival compared to GEM-based chemotherapy, it is not recommended to the majority of the patients due to high toxicity and side effects. Therefore, novel therapeutic approaches for patients with PDAC are needed [1, 2]. The main aim of this work is to establish and characterize a novel GEM-resistant PDAC cell line, as a model to test new drugs/compounds able to counteract drug resistance in PDAC. **Methods:** A new PDAC cell line resistant to GEM, named PANC1-CDR, was established by exposing the PANC1 cell line (from ATCC) to increasing concentrations of GEM every 2 weeks during 6 months, starting from 0.083 μM up to 0.73 μM . Sulforhodamine B assay was performed to confirm PANC1-CDR resistance to GEM, and to compare the cell growth of both cell lines. The expression of relevant tumourigenic proteins was assessed by Western blot. **Results:** Our results demonstrated that PANC1-CDR cells are (205-fold) resistant to GEM and present a slower growth rate, when compared to their sensitive counterpart cells. Importantly, the PANC1-CDR resistant cells have increased expression of several proteins, including chitinase-3-like-1 (CHI3L-1), phospho-ERK, integrin- α 2 and fibronectin, when compared to PANC1 sensitive cells. **Conclusions:** We established a PDAC cell line resistant to GEM. This cell line could be used as a newly established model to identify novel drugs/compounds against promising therapeutic targets, such as CHI3L-1, which is highly expressed in these resistant cells and is known to be involved in PDAC drug resistance [3].

Keywords: Pancreatic Cancer, Gemcitabine, CHI3L-1, Drug Resistance.

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21947 | Sarcopenia in an Internal Medicine department and the relationship with cognitive function

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Background & Aim: Sarcopenia, a skeletal muscle disorder has personal and socioeconomic impact⁽¹⁾. Cognitive impairment (CI) is the decline of 1 or more cognitive domains⁽²⁾. We aimed to study the possible relation between the prevalence of sarcopenia and cognitive function in the internal medicine department. **Methods:** We studied sarcopenia by handgrip strength(HGS)(Gripwise[®]), mid-arm muscle circumference(MAMC)⁽³⁾ and calf-circumference(CC); CI by Mini-Mental-State-Examination(MMSE)⁽⁴⁾. Weight, height, Body Mass Index(BMI)⁽⁵⁾, fat and muscle mass using skinfolds(Lipowise[®]) were assessed. **Results:** 70 women and 92 men admitted in internal medicine service were included, on average aged 81 and 76, BMI 27.4 and 25.1kg/m², body fat(BF) 33.9 and 22.3%, MAMC 19.2 and 21.9cm, CC 31.9 and 32.2cm and HGS 8.5 and 18.3kgF, respectively. 23 and 25 points were obtained on MMSE for women and men, respectively. 91.4%, 44.4%, 36.6% had suggestive values of sarcopenia using HGS, MAMC and CC, respectively. By MMSE, 36.4% had CI. A positive and statistically significant correlation was found between HGS(rs= 0.412;p<0.001), MAMC(rs= 0.328;p<0.001), CC(rs=0.381;p<0.001) and cognitive function. There was also found that BF was positively associated with MMSE score, however it was not significant (rs=0.055; p=0.484). **Conclusions:** We conclude that patients with a better nutritional status had better cognitive function since they had higher MMSE scores.

Keywords: Sarcopenia, Cognitive Function, Nutritional Status.

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21956 | Revolutionizing Spine Health: *in vivo* validation of a fetal-inspired biomaterial

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Background and aim: Low back pain (LBP) affects over 80% of the people and is often caused by intervertebral disc (IVD) degeneration¹, which occurs with ageing². Our group has recently demonstrated that decellularized fetal bovine IVDs, co-cultured with adult disc cells, presented higher levels of Aggrecan and Collagen II (prototypical of a healthy environment) and an increased anti-angiogenic effect *in ovo*³. Given the lack of effective solutions for IVD degeneration⁴, the aim of this work was to validate the therapeutic potential of the previously developed fetal-inspired biomaterial *in vivo*. **Methods:** IVDs from fetal bovine tails (local abattoirs' byproducts) were isolated and decellularized using a previously optimized detergent-based protocol³. Different milling methods were tested to enable injectability through a 30G needle, namely Pulverisette 23 (Fritsch), Analytical Mill A10 basic (IKA) and 4-place Mini Bead Mill homogeniser (VWR). Automatization and optimization of a scalable decellularization process, as well as its yield, were also addressed. Wistar rat IVDs at 14-16 weeks old were needle punctured to induce degeneration and, 2 weeks after lesion, the biomaterial under study was administered. Animals were sacrificed 4 weeks after treatment. Pain behaviour (von Frey test), IVD height (MRI), degeneration score and hernia volume (histology) were assessed. **Results:** The Mini Bead Mill was the best option for milling, enabling injectability in 50 cycles. Vacuum improved decellularization process rate. Regarding Von Frey, fetal administration shows differences in sensitivity when compared to the lesion, presenting similar levels to naïve. Contrarily, saline exhibits reduced sensitivity, suggesting analgesia. Remaining parameters are currently under evaluation. **Conclusion:** This preclinical study validates the injectable fetal-inspired biomaterial in a rat model of IVD degeneration, opening new avenues for LBP treatment while promoting circular economy by using waste for biomaterial production.

Keywords: Biomaterial, Decellularization, Degeneration, Intervertebral Disc, *In Vivo* Study.

Acknowledgments

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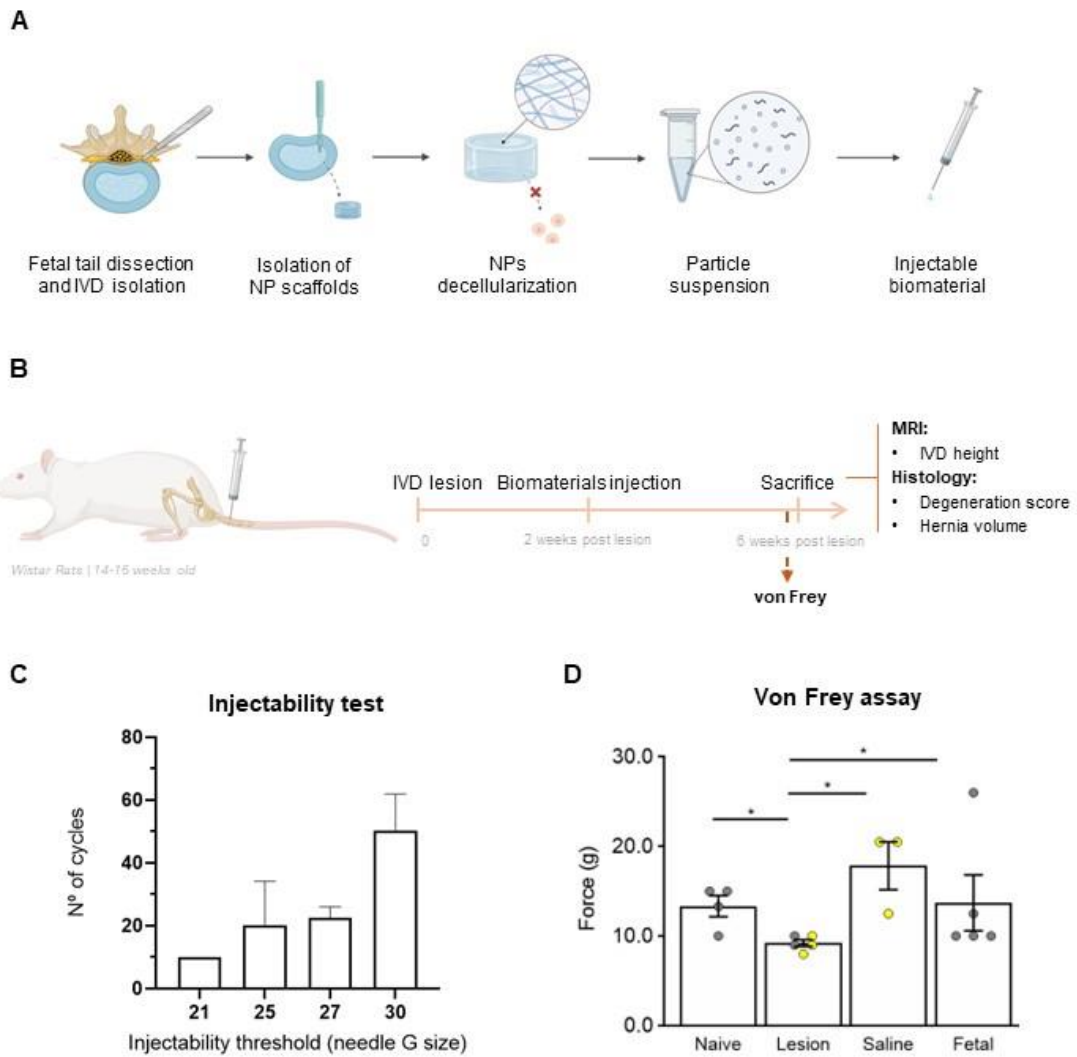


Figure 1: A) Schematic representation of biomaterial production. B) *in vivo* timeline and parameters evaluated. C) Biomaterial injectability test. D) Behavioural test by Von Frey. Data presented with bar graphs with mean and standard deviation. Mann Whitney test (one-tailed) was performed. Differences were considered statistically significant if * $p < 0.05$ vs. lesion group.

21973 | Can Ovarian Cellular Senescence play a role in the development of Epithelial Pre-neoplastic lesions?

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Background & Aim: During ovarian ageing a population of macrophages with senescent-like markers was identified and its accumulation correlated negatively with follicle pool [1,2]. Given the growing evidence that cellular senescence is a contributor to oncogenesis, in a senescence-associated secretory phenotype-dependent manner, we aimed to unveil possible links between the observed unique population of macrophages and the presence of epithelial pre-neoplastic lesions. **Methods:** Ovaries from young and reproductively aged animals were used: 3- and 9-months old mice; 5- and 24-months old rats. Sudan black B and hematoxylin and eosin staining of sections were used to identify lipofuscin and assess structural changes, respectively. Immunohistochemistry and western blot (WB) were carried out to analyze IgG accumulation and extracellular matrix remodeling. Additionally, the effect of apocynin (5 mM in the drinking water for 7 weeks) on IgG accumulation was also tested. **Results:** In the medulla of ovaries of mice and rats, there was a significant age-related increase in macrophages. In addition, sections exhibited age-related enhancement in IgG labelling. These changes were accompanied by an increase in atypical epithelial cells and alterations in the expression pattern of α -actin, namely the appearance of extra WB bands with higher molecular weights. Reproductively aged mice treated with apocynin had ovarian IgG labelling similar to juveniles. **Conclusions:** During reproductive ageing accumulation of macrophages with a senescent-like phenotype is accompanied by epithelial cell structural changes, which may reflect the onset of pre-neoplastic lesions. The enhanced IgG labelling is likely to be part of the mechanism for macrophage recruitment and activation. In this context, the use of a senostatic drug may contribute to delay cell changes and ovarian ageing. Additional work is needed to further understand the link between senescence and cancer development or progression.

Keywords: Ovarian Ageing, Macrophage Senescence, Autoimmunity, Abnormal Epithelium, Apocynin.

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21982 | Synergic role of ibuprofen and chitosan/poly-gamma-glutamic acid nanoparticles in chondrogenesis promotes collagen deposition under a pro-inflammatory environment

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Background & Aim: Osteoarthritis (OA) is a degenerative disease in articular cartilage characterized by a strong inflammatory reaction and chronic pain [1]. Standard therapies, namely non-steroid anti-inflammatory drugs (NSAID), typically focus on treating symptoms, while carrying several drawbacks and failing to repair or regenerate the cartilage tissue back to its healthy functioning [2]. In the present study, Chitosan (Ch) and Poly-Glutamic Acid (PGA) polymeric nanoparticles (NPs) were loaded with Ibuprofen (Ibuf), a NSAID widely used in OA, and their ability to control inflammation and promote chondrogenesis under a pro-inflammatory setting were evaluated *in vitro*. **Methods:** Ibuprofen-Ch/PGA nanoparticles (Ibuf-NPs) were produced by co-acervation method [3]. Physicochemical characterization of Ibuf-NPs was performed by dynamic light scattering (DLS) and Fourier-transform infrared spectroscopy (FTIR), and Ibuf release was assessed by UV/VIS. Human bone marrow-derived mesenchymal stem/stromal cells (MSCs) were cultured in 3D pellets for 14 days in chondrogenic medium supplemented with the pro-inflammatory cytokine IL-1 β [4], and the anti-inflammatory potential of Ibuf-NPs was evaluated. MSC cartilaginous extracellular matrix (ECM) was characterized by histology/ immunohistochemistry. **Results:** Ibuf-NPs (200nm, 0.2 Pdl, 20mV charge) were obtained, with high drug entrapment efficiency (>90%), and fast release at physiological pH. Both free drug and Ibuf-NPs significantly reduced prostaglandin E2 (PGE2), a potent inflammatory mediator [5], in IL-1 β -stimulated MSC pellets, but only Ibuf-NPs significantly stimulated collagen deposition, specifically collagen type 2, the predominant component of cartilage ECM [6]. **Conclusions:** Overall, these results emphasize the synergic potential of Ibuprofen and Ch/PGA NPs to promote MSC chondrogenesis under a pro-inflammatory setting. This study opens new horizons in NSAID-based therapies to modulate inflammation and cartilage regeneration in the context of OA.

Keywords: Chondrogenesis, Inflammation, Nanoparticles, NSAID.

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22016 | Empowering Health: Enabling a battery-less Smart Vascular Graft

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Background & Aim Peripheral Artery Disease and Coronary Artery Diseases contribute to most cardiovascular deaths worldwide and are characterized by the narrowing or blockage of arteries, compromising the blood flow on limbs and heart, respectively [1]. For severe cases, bypass surgery with autologous grafts is the gold standard procedure to re-establish the blood flow. However, these grafts are limited and some of them often fail due to thrombosis. To tackle this, our group developed the GO-Graft, a synthetic vascular graft made of poly(2-hydroxyethylmethacrylate) (pHEMA) mechanically reinforced with graphene oxide (GO), which is readily available and prevents thrombosis [2]. Despite overperforming commercial grafts, the biomedicine world aims to revolutionize the diagnosis of medical devices failure from episodic and symptoms-based to continuous monitoring. This study aims to confer smart abilities to the GO-Graft introducing a self-monitoring feature that operates without requiring a battery. For this, triboelectric nanogenerators (TENGs) will be used to harvest energy from our body motion, being this electric energy used to power sensors. **Methods:** GO-Grafts with 2 different graphene materials (GO) and reduced GO and wall thicknesses (500 μm and 1 mm) were produced. The grafts were characterized using Scanning Electron Microscope (SEM) and contact angle measurements. Triboelectric outputs were measured using an electrometer and an oscilloscope. The ability of materials to charge capacitors was evaluated. **Results:** Using a customized mold developed by us, we produced GO-Grafts with different wall thickness. The degree of oxidation of graphene materials does not affect surface topography. Regarding surface wettability, our materials are hydrophilic. Using the produced grafts, we were able to obtain a triboelectric output and charge capacitors. **Conclusions:** This study shows the applicability of the triboelectric phenomenon in GO-Graft, supporting the idea of creating a smart graft.

Keywords: Bypass surgery, Energy Harvesting, Biomaterials, Smart prostheses.

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22022 | Histamine Poisoning, the toxin that escapes through our nose

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Background & Aim: Histamine poisoning (HP) occurs after consuming certain fish species (e.g., tuna/mackerel/sardine/anchovy) improperly handled or stored due to bacterial spoilage with histidine decarboxylase producers. Despite being preventable with proper fish care, European Food Safety Authority (EFSA) reports HP as the second most common hazard in fish products. This study assesses the knowledge and practices of fishermen, fish sellers and consumers in Spain (SP) and Portugal (PT) and aims to understand why SP has the second-highest reported cases of HP in Europe. **Methods:** An online survey (MyForms) involved 99 PT and 21 SP consumers, focusing on exploring their understanding of HP and related practices. Face-to-face interviews with 11 fish professionals (3 fish sellers from Lota Matosinhos/PT; 4 fish sellers from Lota Almeria/SP; 2 fishermen from PT and 2 fishermen from SP) were conducted to characterize sales and storage practices. Excel was used for data analysis (proportions and means). **Results:** 71% of surveyed consumers in PT (70/99) and SP (15/21) were unfamiliar with HP. One SP consumer reported HP symptoms and was hospitalized, while 5 PT consumers had symptoms, with only one requiring hospitalization. Fish professionals in PT (4/5) and SP (4/6) were also unfamiliar with HP. In both countries, all fish sellers reported adhering to safety practices like daily ice reloads and cleaning. Notably, PT fish sellers demonstrated superior practices, storing fish for a maximum of 2 days (3/3 surveyed), while 3 out of 4 fish sellers in Spain admitted storing fish for 3-4 days. This may contribute to higher reported HP cases/outbreaks in SP if widespread across the country. **Conclusions:** This academic study provides valuable insights into fish storing and selling conditions despite its modest scale. Increasing awareness among the general population about food safety from an "Ocean-to-Fork" perspective appears to be one effective approach to prevent microbial hazards related to fish products and HP.

Keywords: Histamine Poisoning, Scombridae, Food Hygiene, One Health, Fish Consumption.

22025 | Decoding the endocrine pancreas regulome and its implications in type 2 diabetes development

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The endocrine pancreas plays a crucial role in regulating glucose homeostasis, and its dysfunction may lead to type 2 diabetes (T2D). T2D-associated genetic variants were identified in the non-coding genome, most of them overlapping with predicted enhancers, which are cis-regulatory sequences that control gene expression¹. This suggests a connection between the malfunction of pancreatic enhancers and the genetic susceptibility to T2D, although, in vivo models to study this hypothesis are scarce². We aim to validate predicted endocrine enhancers in the landscape of key endocrine pancreas genes, such as *neurod1*, *foxa2*, *gck*, and *hnf1a*, known to be related to T2D development. For the validated pancreas enhancers, we aim to perform their loss-of-function and explore T2D phenotypes. We selected candidate enhancers for each gene by analyzing zebrafish endocrine pancreatic islets assay for transposase-accessible chromatin (ATAC-Seq) and H3K27ac chromatin immunoprecipitation followed by sequencing (ChIP-seq) unpublished datasets. Using transgenic reporter assays in zebrafish, the pancreas-specific enhancer activity of these putative enhancers is being validated. The transposon (containing the putative enhancers upstream of a minimal promoter and a GFP-encoding gene) was introduced into the zebrafish genome through microinjection, and the colocalization of GFP with endocrine markers is done by confocal microscopy. The association between T2D and the identified enhancers will be addressed by deleting validated sequences and observing pancreas phenotypes. We found twenty-three candidate sequences with putative enhancer activity in the zebrafish endocrine pancreas, and we are generating zebrafish transgenic lines for eighteen of those putative enhancers. We have identified six founders for one *hnf1* enhancer. These transgenic lines will enable us to validate in vivo these enhancers and to find human functional orthologs enhancers, to later address how the loss-of-function of these enhancers can lead to T2D.

Keywords: Type 2 Diabetes, Enhancers, Zebrafish Model.

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22037 | Blockage of the inhibitory drive mediated by nicotinic $\alpha 7$ receptors in perisynaptic Schwann cells ameliorates the neuromuscular performance in rats with autoimmune *Myasthenia gravis*

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Background & Aim: Nicotinic $\alpha 7$ receptors ($\alpha 7$ nAChRs) in perisynaptic Schwann cells (PSCs) control acetylcholine spillover from the neuromuscular (NM) synapse^{1,2} through adenosine release via type 1 equilibrative nucleoside transporters (ENT1) and retrograde activation of presynaptic A_1 inhibitory receptors¹. This mechanism is strengthened by cholinesterase inhibitors (AChEi)¹. Yet, NM transmission failure in patients with *Myasthenia gravis* (MG) prompts for the use AChEi. Given this apparent paradox, we tried to go more depth into the molecular modulation of the PSCs $\alpha 7$ nAChRs-mediated inhibitory drive favored by AChEi in a rat model of experimental autoimmune MG (EAMG). **Methods:** Phrenic nerve-hemidiaphragm preparations were isolated from healthy controls and EAMG Wistar rats³ (ORBEA approval, 224/2017) to assess nerve-evoked transmitter exocytosis¹ and the amplitude of myographic recordings during high-frequency (50 Hz) neuronal bursts³. **Results:** Tetanic-induced muscle contractions of EAMG rats were less resistant to fatigue due to progressive rundown of transmitter exocytosis ($n=7$; $p<0.001$) compared to controls ($n=10$). These deficits were exaggerated in the presence of AChEi, neostigmine (500 nM, $n=6$) or ambenonium (500 nM, $n=5$); the $\alpha 7$ nAChR selective antagonist, methyllycaconitine (MLA, 20 nM, $n=5$), prevented the effects of the two AChEi in both animal groups. In EAMG animals, the ENT1 transport inhibitor, dipyridamole (500 nM), a vasodilator and **antiplatelet agent**⁴, **fully reversed** the paradoxical inhibitory effect of neostigmine (500 nM, $n=8$) on nerve-evoked exocytosis and decreased the myographic rundown of diaphragm contractions ($n=4$). Dipyridamole and neostigmine ($n=5$) act synergistically to recover NM performance in EAMG animals. **Conclusions:** Data suggest that selective blockage of PSCs $\alpha 7$ nAChRs and/or inhibition of ENT1 improves NM transmission performance in the presence of AChEi, thus prompting for the repurpose of the therapeutic use of dipyridamole to ameliorate myasthenic symptoms.

Keywords: Neuromuscular Junction, *Myasthenia Gravis*, Perisynaptic Schwann Cells, Nicotinic A7 Receptors, Type 1 Equilibrative Nucleoside Transporters.

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22041 | Long-term effect of musculoskeletal pain history and experimental pain responses on adolescents' quality of life: a cohort study

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Background & Aim: Musculoskeletal (MSK) pain and concurrent quality of life are associated from early ages but little is known on the long-term impact of pain profiles in non-clinical settings. We aimed to quantify the association between MSK pain at age 13 years and quality of life 4 years later, using data from the Generation XXI cohort. **Methods:** Any MSK pain (any pain in the prior 3 months in back, neck/shoulders, upper and lower limbs, hips, unspecified MSK, or generalized) and Chronic MSK pain (lasting >3 months) were assessed using the Luebeck questionnaire at age 13 (n=574). A subsample (n=192) underwent quantitative sensory testing to assess pain detection and tolerance thresholds, and temporal summation of pain effects. At age 17, quality of life was assessed in 6 subscales (physical well-being, emotional well-being, self-esteem, family, friends and school) using the Kiddo-KINDL questionnaire. Comparative analysis was conducted using t-tests. We quantified associations between experimental pain responses and quality of life using linear regression. **Results:** Adolescents with Any MSK pain at age 13 had, at age 17, significantly lower mean scores in the physical well-being subscale compared to those without MSK pain (61.14 vs. 65.53, p=0.003). Adolescents with Chronic MSK pain reported lower quality of life for the physical well-being (58.97 vs. 64.77, p=0.002), emotional well-being (63.38 vs. 67.85, p=0.036) and friends subscales (64.02 vs. 68.8, p=0.020) and overall quality of life (59.76 vs. 63.03, p=0.021) when compared to those without Chronic MSK pain (Table 1). Temporal summation of pain was associated with physical well-being [-2.24 (-4.31, -0.18)], emotional well-being [-3.77 (-6.05, -1.48)], friends [-3.03 (-5.22, -0.84)] and overall quality of life [-2.23 (-3.86, -0.60)] (Table 2). **Conclusions:** Pain in early adolescence was associated with lower quality of life 4 years later, underlining the importance of early assessment and management in shaping future psychosocial well-being.

Keywords: Chronic Musculoskeletal Pain, Quantitative Sensory Testing, Quality of Life, Birth Cohort, Prospective Study.

Acknowledgments

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QST at age 13	Quality of life scores at age 17						
	Physical well-being	Emotional well-being	Self-esteem	Family	Friends	School	Overall
Pain detection threshold (PDT)	0.06 (-0.18 to 0.30)	0.08 (-0.20 to 0.35)	-0.11 (-0.42 to 0.21)	0.01 (-0.24 to 0.26)	0.05 (-0.21 to 0.31)	-0.01 (-0.25 to 0.23)	0.01 (-0.18 to 0.21)
Pain tolerance threshold (PTT)	-0.03 (-0.16 to 0.10)	-0.01 (-0.15 to 0.14)	-0.05 (-0.22 to 0.11)	0.00 (-0.13 to 0.13)	-0.03 (-0.16 to 0.11)	-0.05 (0.18 to 0.08)	-0.03 (-0.13 to 0.08)
VAS-I	0.35 (-0.84 to 1.54)	0.26 (-1.08 to 1.59)	-0.13 (-1.68 to 1.41)	-0.51 (-1.71 to 0.70)	-0.01 (-1.28 to 1.26)	0.59 (-0.58 to 1.75)	0.09 (-0.86 to 1.04)
VAS-II	-2.29 (-1.34 to 0.76)	-0.75 (-1.93 to 0.42)	-0.50 (-1.86 to 0.87)	-0.87 (-1.92 to 0.19)	-0.77 (-1.89 to 0.35)	0.22 (-0.81 to 1.25)	-0.49 (-1.33 to 0.34)
Difference between VAS-II and VAS-I	-2.24 (-4.31 to -0.18)	-3.77 (-6.05 to -1.48)	-1.55 (-4.26 to 1.16)	-1.85 (-3.96 to 0.26)	-3.03 (-5.22 to -0.84)	-0.94 (-2.99 to 1.11)	-2.23 (-3.86 to 0.60)

Table 1: Mean (standard deviation, SD) quality of life scores at age 17 years among adolescents with and without Any musculoskeletal pain (MSK) or Chronic MSK pain at age 13 years.

Reported pain at age 13		Quality of life scores at age 17						
		Physical well-being	Emotional well-being	Self-esteem	Family	Friends	School	Overall
Any MSK pain	Yes (n=203)	61.14 (18.40)	65.67 (19.92)	50.89 (22.85)	80.20 (16.51)	67.43 (18.70)	45.23 (16.57)	61.76 (13.14)
	No (n=371)	65.53 (17.71)	68.11 (19.63)	50.64 (23.91)	79.40 (18.79)	68.50 (18.49)	46.07 (17.77)	63.04 (13.48)
	p-value	0.003	0.080	0.450	0.297	0.255	0.284	0.135
Chronic MSK pain	Yes (n=78)	58.97 (15.85)	63.38 (20.31)	48.00 (23.44)	80.92 (17.50)	64.02 (18.63)	43.27 (15.66)	59.76 (13.01)
	No (n=496)	64.77 (18.28)	67.85 (19.61)	51.16 (23.53)	79.46 (18.09)	68.76 (18.48)	46.17 (17.58)	63.03 (13.38)
	p-value	0.002	0.036	0.135	0.251	0.020	0.069	0.021

Table 2: Linear regression coefficients (95% confidence intervals) for associations between quantitative sensory testing (QST) parameters at age 13 and quality of life scores at age 17.

22051 | Rejuvenation of aged osteoprogenitor mesenchymal stem cells through mechanical-induced purinome priming: in vitro expansion and pre-clinical proof-of-concept

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Background & Aim: Endogenously released adenine and uracil nucleotides activate ATP-sensitive P2X7R and UDP-sensitive P2Y₆R, respectively, to promote osteogenic differentiation of bone marrow mesenchymal stem cells (BM-MSCs)^[1,2]. The osteogenic differentiation of BM-MSCs is hindered in post-menopausal (Pm) women due to overexpression of the nucleotide-metabolizing enzyme NTPDase³. Nevertheless, mechanical stimulation (MS) of these cells restores their osteogenic potential resulting in the formation of bone nodules via tonic activation of P2X7R and P2Y₆R. These findings coincide with the observation that mechanically-stimulated cells possess higher intracellular ATP reservoirs, release more ATP and overexpress P2X7R and P2Y₆R compared to non-stimulated cells. Here, we explored in an animal model if xenotransplants of MS BM-MSCs from PM women accelerate their osteointegration and bone repair *in vivo*. **Methods:** BM-MSCs were harvested from 4 Pm women (71±7yr, ethical approval nº137/2018-2), which were cultured for 21 days in an osteogenic-inducing medium. The cells were submitted (or not) to MS (90 rpm, 30 min) twice a week in either in the absence or presence of P2Y₆R or P2X7R antagonists. Primed cultured cells embedded in a collagen scaffold were xenotransplanted into critical bone defects drilled in the great trochanter of 1-yr old female Wistar rats. Bone repair was assessed by histological analysis 10 days after xenotransplantation. **Results:** Non-stimulated cells ($n=4$) partly filled the bone defect with the following proportion: 60±12% of mesenchymal tissue (MT) and 37±11% of endochondral ossification (EO). The group of animals transplanted with MS cells ($n=4$) showed larger EO (67±13%, $P<0.05$) and woven bone (WB) areas (18±18%, $P<0.05$) than controls. The proportion of MT was 43±8% and 49±21% and the total EO area was 50±8% and 51±22% when MT cells were tested in the presence of P2X7

(A438079, 3 μ M) and P2Y₆ (MRS2578, 100 nM) antagonists. **Conclusions:** These findings strengthen the putative therapeutic role of MS to promote purinome-induced rejuvenation of Pm BM-MSCs for using in bone tissue engineering tactics.

Keywords: Post-Menopausal Osteoporosis, Mesenchymal Stem Cells Transplantation, Osteogenesis, Purinergic Signalling, Mechanical Stress.

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22057 | In-depth characterization of vancomycin-resistant *Enterococcus faecium* from hospitalized patients at a Portuguese hospital, 2022-2023

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Background & Aim: Vancomycin-resistant *Enterococcus faecium* (VREfm) are challenging leading hospital pathogens, included in the WHO global priority list of antibiotic-resistant bacteria [1], but epidemiological studies about VREfm in Portuguese hospitals are lacking since the 2000's [2]. We aimed to characterize VREfm obtained from one hospital in the Porto metropolitan area during 2022-2023. **Methods:** Thirty-three pure cultures obtained from different clinical specimens were sent by the hospital in blood agar plates and were inoculated onto Slanetz-Bartley Agar. Colonies with different morphologies (typical of *Enterococcus* spp.) were further cultivated onto BHI agar. To specifically select VREfm, PCR screening of *vanA/vanB* genes was performed along with species-specific genes (*gluP*) to distinguish *Enterococcus faecium* and *Enterococcus lactis* [3]. Antibiotic susceptibility was done by disk-diffusion or broth-microdilution (linezolid) (EUCAST/CLSI). WGS (Illumina-NovaSeq) was performed on the linezolid-resistant isolate. **Results:** All VREfm harbored the *vanA* gene and were multidrug-resistant (MDR: resistant to ≥ 3 antibiotics of different families). All isolates were resistant to ampicillin, ciprofloxacin, vancomycin and teicoplanin. Most to erythromycin (93%) and quinupristin-dalfopristin (87%), and less to tetracycline (20%), streptomycin (17%), gentamicin (7%), chloramphenicol (3%), or linezolid (3%; MIC=8mg/L). Linezolid resistance resulted from the G2576T mutation in the 23s rRNA gene. Preliminary findings indicated one case with different colonies exhibiting variable susceptibility to streptomycin. **Conclusions:** Contemporaneous VREfm isolates are MDR, demanding dependence on last-resort alternatives. The *vanA* gene continues to be the dominant gene in local VREfm. Continuing surveillance of linezolid susceptibility and the need for different approaches investigating colony-level diversity are needed to optimize treatment, infection control and antibiotic stewardship.

Keywords: *Enterococcus Faecium*, Hospital Infections, Antimicrobial Resistance, *Vrefm*, Public Health.

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Trigger Endothelial Dysfunction in Heart Failure with Preserved Ejection Fraction
(HFpEF)

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Introduction: HFpEF management is a significant clinical challenge considering its high prevalence (~50% of all heart failure cases), poor prognosis (5-years mortality of 50%) and absence of effective therapeutics. The present pathological perspective on HFpEF development is that numerous comorbidities, often present in these patients, potentiate a meta-inflammatory state that triggers myocardial microvascular dysfunction, leading to a stiffer heart with impaired diastolic function, but the precise pathophysiological mechanisms remain elusive. **Aim:** As extracellular vesicles (EVs) are pivotal vehicles of long-distance communication, this work aims to unveil the role of circulating EVs in delivering deleterious signals to the heart of HFpEF patients, particularly to cardiac endothelial cells. **Methods:** Peripheral blood was obtained from HFpEF and comorbidity-matched control patients (CTRL) at Centro Hospitalar São João. EVs were isolated from plasma by size-exclusion chromatography and characterized accordingly with MISEV2018. **Results:** Cardiac microvascular endothelial cells (cMVECs) challenged with HFpEF patients' EVs displayed signs of augmented cellular senescence (increased lysosomal endogenous-Beta-galactosidase, reactive-oxygen species (ROS), DNA damage and senescence-associated-secretory-phenotype) and enhanced monocyte adhesion, compared to CTRL. Proteomic analyses on HFpEF and CTRL EVs, revealed that the protein S100A9 was more abundant in HFpEF patients. To assess whether S100A9 was involved the aforementioned deleterious effect of EVs, we further showed the S100A9 inhibitor paquinimod was able to revert HFpEF EV-induced effect on ROS and monocyte adhesion to MVECS. **Conclusion:** Our findings elucidate the role of EVs in HFpEF pathology, underscoring the potential of targeting S100A9 with paquinimod as a promising therapeutic strategy.

Keywords: Heart, HFpEF, Extracellular Vesicles, Paquinimod.

22064 | Addressing the role of maternal age on the metabolic profile of the placenta

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Background & Aim: After the age of 35, during pregnancy, there is an increased risk of impaired placentation. Changes in uterine redox balance seem to play a role in deficient placentation (1). We hypothesized that this local redox dysregulation has a negative impact on the placenta metabolic profile. Thus, we aimed to study the placenta metabolic profile during reproductive aging and the effect of antioxidant supplementation. **Methods:** Placentas were collected from pregnant women aged between 22 and 41 years, and from mice of different ages (3 or 9 months). Additionally, 9-month-old mice were treated with apocynin (5 mM) in the drinking water (3 weeks prior to and during pregnancy). Semi-quantitative real-time PCR was carried out to assess the expression of glucose and fatty acid transporters. Quantitative results are presented with standard error of the mean (SEM). In the human study, Spearman's correlation was used for the comparative analysis of the variables studied. In the animal model, Student's t-test was used for comparative analysis of the variables studied. A p-value of less than 0.05 was considered statistically significant. **Results:** Concerning glucose transport, the results show that the expression of glucose transporter 1 is strongly negatively correlated with maternal age ($r = -0.710$; $p = 0.0121$). Regarding lipid metabolism, there is a strong negative correlation between the fatty acid transporter 4 expression and maternal age ($r = -0.6865$, $p = 0.0233$). In mice, the expression of glucose transporter 1 was also decreased in 9-month-old females ($p = 0.0329$, when compared to the 3-month-old females group). No differences were observed between the reproductively aged females treated with apocynin and the young females ($p = 0.1990$). **Conclusions:** The results of this study show that reproductive aging is linked with changes in the placenta metabolic profile. In the mice study model, antioxidant supplementation attenuated the changes observed in nutrient transport in the placenta.

Keywords: Placenta, Reproductive Aging, Metabolism, Nutrient Transporters.

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22067 | Determinants of food consumption by University students

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Introduction: The beginning of university is considered a risk period for the development of inadequate eating habits. It is important to develop public health strategies that help prevent and solve this problem. The adherence to healthy lifestyles at a young age plays a significant role in preventing disease and promoting health throughout an individual's life cycle. **Aim:** In this sense, the present study aimed to study determinants of food choice and the relationship between the level of education (bachelor ou higher). **Methodology:** This cross-sectional study, include 421 (328 females) students from Porto University, who completed an online questionnaire with sociodemographic characteristics, self-perceived health, determinants of food choice, where lunch is consumed, frequency of SASUP canteen use, and satisfaction of the food/meals provided by the university. **Results:** Only 24,8% of undergraduate students and 12,3% of post-graduate students considered "having a healthy diet" as the main determinant of food choice ($p=0,021$). Education level (bachelor or higher than) was not significantly associated with the frequency of use the SASUP canteen ($p=0,923$). Regarding self-perception of health, there were no significant differences between undergraduate and post-graduate students ($p=0,900$). The frequency of canteen use was not significantly associated with the perception of health ($p=0,555$). **Conclusions:** Considering "having a healthy diet" as the main determinant of food choice was the only factor associated with the education level. This information will help in the definition of strategies that will help us promote the adoption of better eating habits among university students.

Keywords: Nutrition, University, Canteen, Undergraduate, Post-Graduate, Perception of Health, Healthy Diet.

22101 | Neuronal plasticity changes to preserve ACh release from myenteric nerves via Ca²⁺-permeable P2X4, P2X7 and TRPV1 ionotropic receptors in post-inflammatory ileitis

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Background & Aim: Inflammatory Bowel Diseases (IBDs) alter enteric neural functions by unknown mechanisms, possibly, in our hypothesis, by endogenously released purines. Inflammation-induced superfluous ATP overproduction by proliferating glial cells, downregulation of the adenosine-producing interstitial cells of Cajal, and redistribution of NTPDase subtypes mediate changes in the balance between excitatory ATP-sensitive P2X and inhibitory adenosine receptors in TNBS-induced post-inflammatory ileitis [1,2]. Ca²⁺-permeable P2X4R and P2X7R undertake neuroimmune interactions in IBDs and are putative candidates to preserve ACh release from inflamed cholinergic neurons [3]. Here, we also tested the role of the unrelated Ca²⁺-permeable TRPV1R in this endeavor taking into account that it may be involved in intestinal inflammation and pain [4]. **Methods:** Longitudinal muscle-myenteric plexus preparations from the ileum of CTR and TNBS-treated rats were used to evaluate evoked [³H]ACh release, elicited by EFS (S₁ and S₂). **Results:** Blockage of P2X7R with A438079 (3 μM) decreased [³H]ACh release only in TNBS-treated rats (S₂/S₁: 0.48±0.12 n=4 vs 0.71±0.1 n=5). Conversely, the P2X4R antagonist, 5-BDBD (10 μM), inhibited [³H]ACh release in CTR animals (0.48±0.04 n=12 vs 0.83±0.06 n=4), but enhanced the transmitter release in TNBS-treated rats (1.27±0.10 n=5 vs 0.71±0.13 n=5). In the presence of A438079, 5-BDBD was unable to increase [³H]ACh release in TNBS-treated animals (0.66±0.12 n=9). Blockage of the TRPV1R with capsazepine (10 μM) mimicked the effect of the P2X7 blocker in TNBS-treated rats when applied alone (0.46±0.06 n=5) or in the presence of BDBD (0.69±0.06 n=6). Confocal microscopy showed that P2X4R and P2X7R co-localize in cholinergic nerves, as well as in enteric glial cells. **Conclusions:** Data suggest that neuronal plasticity changes orchestrate to preserve cholinergic neurotransmission by balancing the activation of Ca²⁺-permeable P2X4, P2X7 and TRPV1 ionotropic receptors in enteric inflammation.

Keywords: Post-Inflammatory Ileitis, Myenteric Plexus, Purinergic Receptors, Cholinergic Neurotransmission.

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22102 | A novel therapeutic strategy for PDAC patients with impaired Rab27a expression

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Background & Aim: Pancreatic ductal adenocarcinoma (PDAC) boasts one of the most unfavorable cancer prognoses and severely restricted treatment options. While immunotherapy has revolutionized cancer care, its effectiveness in PDAC patients has been disappointing thus far. Therefore, innovative immunomodulatory approaches are urgently required to improve PDAC care. In this study we aimed to understand how PDAC cancer cells reprogram the immune response to cancer in order to identify novel immunomodulatory strategies to treat PDAC.

The Rab27a protein plays a crucial role in exosomes secretion by cells. We have identified a subset of PDAC patients (~25%) who do not express Rab27a in cancer cells. Furthermore, we demonstrate that the expression of Rab27a is either lost or significantly reduced in the tumour compared to adjacent normal tissue. **Methods:** Using in vivo models of PDAC, we functionally assessed the consequences of Rab27a loss in cancer cells. We developed a genetically engineered Rab27a knockout (KO) mouse model that spontaneously develops PDAC, mirroring the histopathology of the human disease. **Results:** We showed that KO of Rab27a in PDAC cancer cells leads to earlier disease onset and worse survival. These tumours displayed a pro-inflammatory response dominated by the recruitment of myeloid CD11b+MRP8+ cells, inducing the production of IL-6 by cancer-associated fibroblasts, subsequently differentiating CD4+ T cells into a Th17 pro-tumour phenotype. Most importantly, depletion of CD4+ T cells or treatments with dexamethasone impair tumour growth exclusively in Rab27a KO tumours. Crucially, we validated our findings by demonstrating that PDAC patients with concomitantly low Rab27a expression and a high number of intratumoural MRP8+ cells have a significantly worse prognosis.

Conclusions: Based on our data, we propose that anti-inflammatory and immunomodulatory

strategies targeting the Th17 response in PDAC patients lacking Rab27a expression hold potential as a novel therapeutic approach for PDAC.

Keywords: PDAC, Immunotherapy, Rab27a, Th17.

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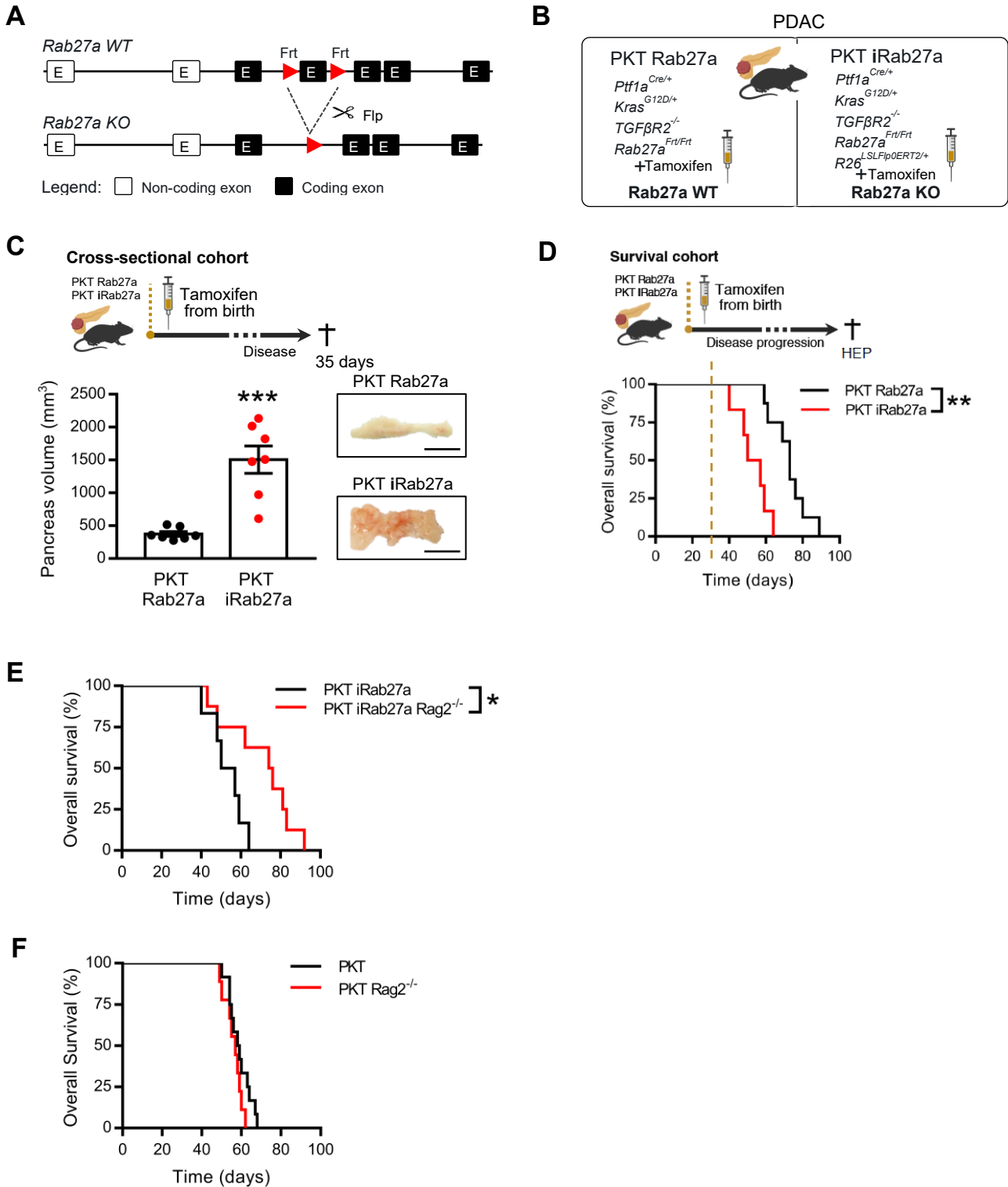


Figure 1: Rab27a knockout in cancer cells promotes PDAC progression specifically in an immunocompetent context. (A) Schematic representation of the *Rab27a*^{FRT/FRT} allele. FRT sites were placed flanking the exon 4 of the *Rab27a* gene. Upon flippase action, exon 4 is excised leading to the *Rab27a* KO allele. **(B)** PKT *iRab27a*, an inducible and conditional *Rab27a* knockout

GEMM that spontaneously develops PDAC. Rab27a knockout is achieved specifically in cancer cells upon tamoxifen treatment. The PKT Rab27a model represents the control group treated with tamoxifen that, due to the lack of the LSL-FlpO-ERT2, expresses Rab27a. **(C)** Representative pancreas images (right) and pancreas volume (left) of PKT Rab27a (n=7) and PKT iRab27a (n=7) treated with tamoxifen from birth and euthanized at 35 days (Unpaired t-test $***p<0.001$). Scale bar represents 10mm. **(D)** Kaplan-Meier survival curve of PKT Rab27a (n=8) and PKT iRab27a (n=6) mice treated with tamoxifen from birth (Log-rank Mantel-Cox test $**p<0.01$). **(E)** Representative photos of H&E staining of PKT Rab27a and PKT iRab27a pancreas (4x, with zoom inset) and histopathological analysis of the percentage of normal, PanIns and PDAC area (Unpaired t-test $*p<0.05$, $**p<0.01$). **(F)** Kaplan-Meier survival curve of PKT iRab27a (n=6) and PKT iRab27a Rag2^{-/-} (n=8) mice treated with tamoxifen from birth (Log-rank Mantel-Cox test $*p<0.05$). Survival curve of PKT iRab27a mice is the same as in **(D)**. **(G)** percentage of PDAC patients with score 0, score 1-5 and score 6-12 of Rab27a expression (n=162).

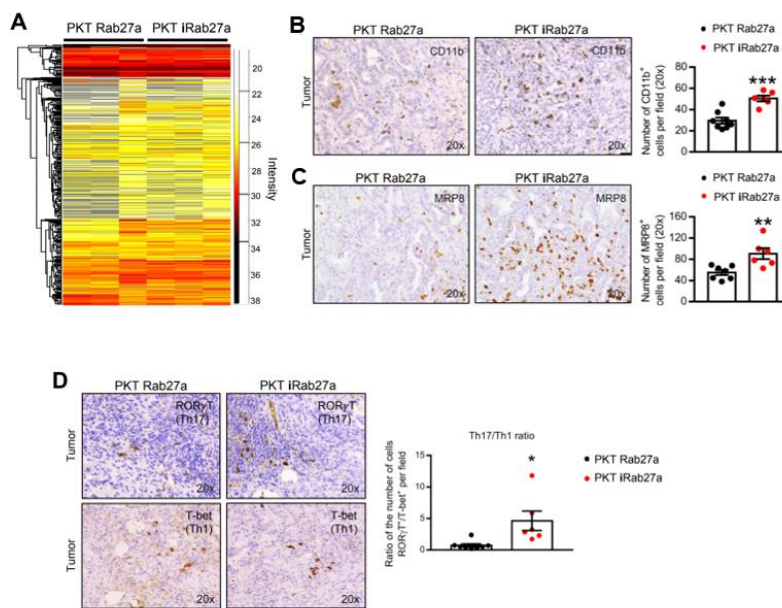


Figure 2: Rab27a knockout tumours present an enrichment in inflammatory cytokines driving a Th17 response. (A) Heatmap depicting protein clusters in PKT Rab27a (n=3) and PKT iRab27a (n=3) whole tumours. **(B)** Representative CD11b IHC images (20x, left) and respective quantification (right) in PKT Rab27a (n=8) and PKT iRab27a (n=6) tumours (Unpaired t-test $***p<0.01$). **(C)** Representative MRP8 IHC images (20x, left) and respective quantification (right) in PKT Rab27a (n=7, one mouse was removed from the analysis since it was identified as an outlier) and PKT iRab27a (n=6) tumours (top) and in KPC Rab27a (n=15) and KPC iRab27a (n=15) tumours (bottom, unpaired t-test $*p<0.05$, $**p<0.01$) **(D)** Representative RORγT and T-bet IHC

images (20x, left) and respective quantification (right) in PKT Rab27a (n=8) and PKT iRab27a (n=6) tumours (Unpaired t-test $*p < 0.05$). Ratio between the average number of ROR γ T⁺ cells and the average number of T-bet⁺ cells was performed.

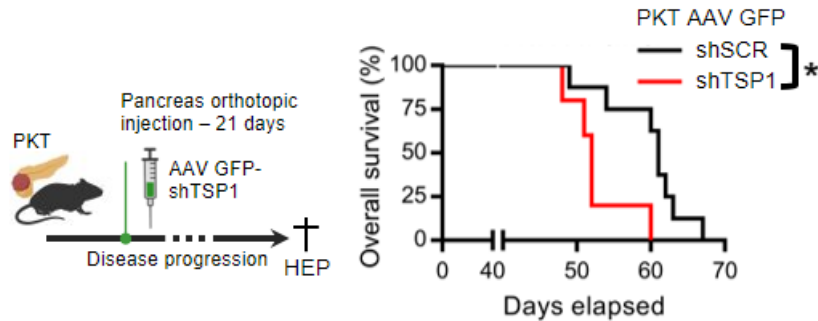


Figure 3: Rab27a regulates TSP1⁺ EVs release and loss of TSP1 leads to neo-angiogenesis in PDAC GEMMs. Experiment schematic (left) and Kaplan-Meier survival curve (right) of PKT mice orthotopically injected with AAV-shSCR (n=8) or AAV-shTSP1 (n=5) at 21 days of age (Log-rank Mantel-Cox test $*p < 0.05$).

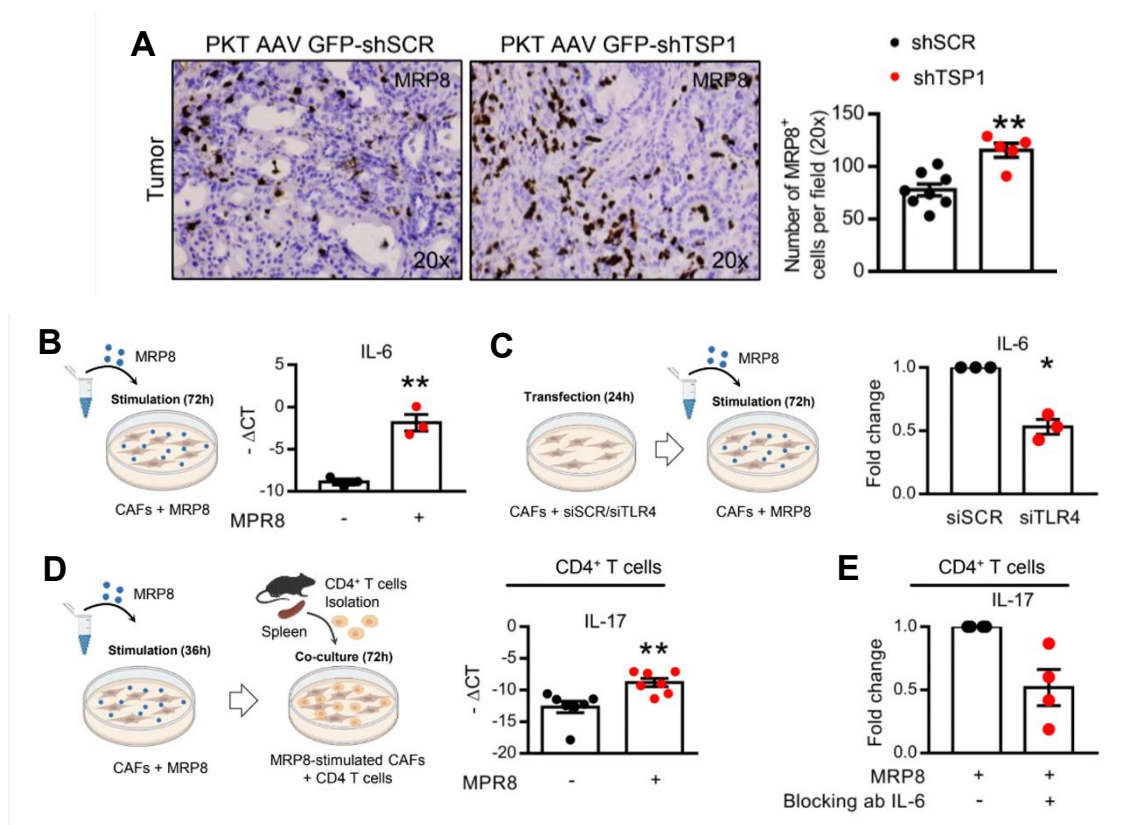


Figure 4: Myeloid-derived MRP8 promotes Th17 differentiation through CAFs-dependent IL-6 release. (A) Representative MRP8 IHC images (20x, left) and respective quantification (right) in

PKT AAV-shSCR (n=8) and PKT AAV-shTSP1 (n=5) tumours (Unpaired t-test $**p<0.01$). **(B)** Experimental layout (left) and IL-6 quantification by qPCR (right) in CAFs isolated from a PKT tumour stimulated with exogenous MRP8 (5 μ g/mL) (n=3, Unpaired t-test $**p<0.01$). **(C)** Experimental layout (left) and IL-6 quantification by qPCR (right) in CAFs isolated from a PKT tumour stimulated with exogenous MRP8 (5 μ g/mL) after transfection with a siSCR or siTLR4 (n=3, Unpaired t-test $*p<0.05$). **(D)** Experimental layout (left) and IL-17 quantification by qPCR (right) in CD4⁺ T cells co-cultured with CAFs isolated from a PKT tumour previously stimulated with exogenous MRP8 (5 μ g/mL) (n=7, Unpaired t-test $**p<0.01$). **(E)** IL-17 quantification by qPCR in CD4⁺ T cells co-cultured with CAFs isolated from a PKT tumour previously stimulated with exogenous MRP8 (5 μ g/mL) in the presence of a blocking antibody for IL-6 (2 μ g/mL) (n=4, Unpaired t-test). Data are mean \pm SEM.

22122 | What is the effect of a mental health literacy program on teacher burnout?

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Background & Aim: Teaching is recognized as a profession with high levels of stress, and experiencing prolonged stress can lead to burnout. Mental health literacy can be critical to teachers' well-being and reduce burnout. The aim is to evaluate the effect of the WhySchool mental health literacy program on Portuguese teachers' burnout. **Methods:** Why ySchool is a mental health literacy program based on a training cascade, implemented in schools in Portugal between 2015-2016. Burnout is assessed with the Portuguese version of the Maslach Burnout Inventory - Educators Survey scale and mental health literacy with the Mental Health Literacy scale developed by EUTIMIA. The sample comprised 309 Portuguese teachers with mean age of 47.29 (SD=6.87) years old, and most participants were women (86.1%). The analysis consists of a balance of generalized logistic models, non-linear and linear regressions, and a keen awareness of potential confounding factors. Regarding depersonalization and personal realization, a linear regression analysis was conducted with the adjusted R² describing the variance explained by our predictors. **Results:** Significant differences were found between the pre- and post-intervention scores across all burnout subscales. Depersonalization and emotional exhaustion decreased post-intervention, while personal realization increased. This suggests the intervention's potential to reduce negative aspects of burnout and enhance positive aspects. **Conclusions:** Empowering teachers through literacy brings potential benefits for reducing burnout and increasing teachers' well-being while enabling them to address potential gaps in students' mental health care. The cascade training ensures effective dissemination of knowledge. All the burnout subscales showed improved results. While knowledge can be improved, translating that knowledge into actionable behaviours or attitudes in real-world contexts requires further exploration.

Keywords: Burnout, Burnout-Reducing Interventions, Mental Health Literacy Program, Teachers.



HISTORY



21425 | A republican newspaper in the beginnings of the Military Dictatorship –

Diário do Porto (1926-1927)

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Background & Aim: Few days before the military coup that established, in Portugal, the Military Dictatorship, emerged, in Porto, a newspaper self-considered republican and that sought to appeal for the improvement of the republican regime. In the beginning, there was an accordance with the military movement, understood as a way of straightening political situation, but, quickly, with the succession of coups that occurred, fierce criticisms of the policy followed by the Dictatorship began to appear on the newspaper's pages. For example, *Diário* has a lot of criticisms to prior censorship to the press to avoid deviations from the doctrine that was intended to be made official. *Diário*, even with this potential obstacle, did not stop openly criticizing the regime and, faced with the first major opposition insurrection, in February 1927, that breaks out in Porto, was favorably positioned in relation to it. On 3rd February, which is the day the movement began, the newspaper was censored and was only published again after the end of the uprising. This was a major obstacle to its agenda, whereby, from now on, criticism became much more moderate. However, *Diário* was unable to resist the structuring of the regime and, in July 1927, fourteen months after the beginning of its publication, disappeared a republican newspaper that didn't accept Dictatorial management. **Methods:** Following a methodology composed by text analysis, content analysis and an analysis specifically on press, we want to understand the importance of its republican newspaper during the first months of Dictatorship. **Results:** We understood how this newspaper was a resistant to the edification of Military Dictatorship, although it couldn't resist to major censorship to the press and the consolidation of this regime. **Conclusions:** It is intended, with this study, analyze how *Diário* sought to resist the Military Dictatorship and how it can be an important source for the study of the upheavals of September 1926 and February 1927.

Keywords: Press, Opposition, Military Dictatorship.

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[1] *Diário do Porto*, 1926-1927

21739 | “Malefactores erant et perversi”: crusader violence and religious coexistence in the Portuguese kingdom during the 12th century”

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Background & Aim: The Crusades were one of the most defining and complex events of the Middle Ages. The early process of formation of the Portuguese kingdom was influenced by foreign fleets of crusaders who, while sailing to the Holy Land, stopped alongside the Iberian coast. These fleets were essential to the conquest of new territories; however, the presence of outsiders in the region proved to be a source of tensions between the Christian forces. Multiple accounts of these relations, mainly foreign sources, have survived and show contrasting interpretations, depending on the origin of the author, and demonstrate a shocking crusader reaction to the religious coexistence characteristic of the Iberian kingdoms. Although Portuguese historiography has analyzed numerous of these accounts, mainly those related to the conquest of Lisbon (1147), it shows a lack of comparative studies between other key moments of crusader intervention in the 12th century, such as the conquest of Silves (1189). This work aims to bridge these events and other relevant ones in a cohesive study about the violence and effects of the crusading fleets in the Portuguese territory. **Methods:** Multiple foreign primary sources were analyzed, such as “*De Expugnatione Lyxbonensi*” and “*Narratio de itinere navali*”, and Portuguese sources, such as “*Crónica de Portugal de 1419*”. In order to elaborate a mental frame of the involved parties, excerpts of these accounts and chronicles were analyzed and highlighted. **Results:** The analysis of these events in a cohesive manner is fundamental for a better understanding of the process of formation of the Portuguese kingdom, but also shows in detail the sometimes-forgotten violence and massacres of these northern fleets, such as in the case of the conquest of Alvor (1189) and the conflicts between crusaders and the population of Lisbon in 1190. **Conclusions:** This study illuminates the often overlooked violence of the crusader fleets in the 12th century Portuguese kingdom.

Keywords: Middle Ages, Crusaders, Conquest, Violence, Portugal.

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21748 | A pioneer in cowpox inoculation: Maria Isabel Wittenhall Van Zeller (1749-1819) – A biographical sketch

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The present work is a biographical sketch of a pioneer vaccinator, Maria Isabel Wittenhall Van Zeller. We focused mainly on her actions as an inoculator in Porto (1805-1819), her most historically visible stage. The state of the art is severely lacking, concerning women's History at the turn of Modern and Contemporary History, as well as that of women vaccinators, and specifically works regarding Isabel's role and impact. The main works cited consist of a biography by Ana Van Zeller¹; a Susana Guimarães² sub-chapter, as well as a José Vaz³ monography, both highlighting Vila Nova de Gaia's and Avintes' History. Regarding vaccination in the time-period, several studies can be named, including Fillipe Portugal's⁴, and José Silva's⁵ dissertations. Qualitative and quantitative methods were used, resorting to graphics and charts, but mainly to document analysis of the laudatory *Aere Perennius*⁶; *Memoirs of the Academy of Sciences*⁷; parish records and Wills; correspondence; and contemporary accounts. Isabel's marriage with Pedro Van Zeller maintained her family's status, resources, and networks. Strong values and bonds among these families were such that they instilled altruistic actions like the inoculation campaigns on her Quinta de Fiães. A widowhood spent pursuing a zealous yet discrete religious life, not through the prosaic joining of a religious order, but by saving the disadvantaged from smallpox, thus using science in God's name, as a symbol for bourgeoisie and evangelical realities. Against the public and the old medical profession's mentalities, Isabel wound up being awarded by the Academy of Sciences and totaled 13.408 vaccinated. Due to scarce sources, paired with contradictory information therein, all facts associated with Isabel have finally been confirmed through exhaustive source analysis. It still needs to be made sure, however, that there isn't any more useful information elsewhere.

Keywords: Women's History, History of Science, Smallpox.

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21873 | “En frente usted!”: State repression in the Minho border in the first year of the Spanish Civil War

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Background & Aim: How far does the state go? The middle of 1936 indicated strong upheavals on the Iberian Peninsula, felt on the border lines. The portuguese *Estado Novo* regime had restructured the armed forces (Rosas, 2013) with a view to border control (Faria, 2018) in order to prevent any movement of "ideological contamination" that could come from the Spanish Republican forces, jeopardizing the consolidation of the regime (Lanero Táboas et al, 2009). At the same time, there was a "fascization" of the regime (Loff, 2008) which had repercussions on the daily lives of the local population, leading them to create practices of resistance (Simões, 2016; Faria, 2018). **Methods:** It will be through the case of Valença do Minho, using qualitative and quantitative methods, that the reality of the Minho region will be comprehended. Using oral history (Portelli, 1997) with post-memory (Hirsch, 2008) and public memory (Frank, 2004) concepts, enabled us to understand the "significances" of the Civil War. Concomitantly, the forms of repression in the region were understood, based on Rodríguez Gallardo (2008) theses on the formulas of "paralegal repression". **Results:** Therefore, we can understand the articulation of Portuguese and Spanish state forces in the administration of repression in the context of the Spanish Civil War. On the other hand, the private sphere was an element of resistance to the orders of the central government aimed at containing the refugees coming from the adjacent border. Through contraband and the setting up of solidarity networks, many people of the region built up support mechanisms for forced migrants, avoiding their surrender or, in many cases, their death. **Conclusions:** We can conclude that a simultaneous process of political socialization from below, and a process of containment from above, generated a common identity in the region. The border presents itself as a space of contradiction: the presence of the state and the assertion of exogenous spaces within its reach.

Keywords: Containment, Political socialization, Repressions, Fascization, Border.

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Travessias fronteiriças para Espanha durante a Guerra Civil Espanhola

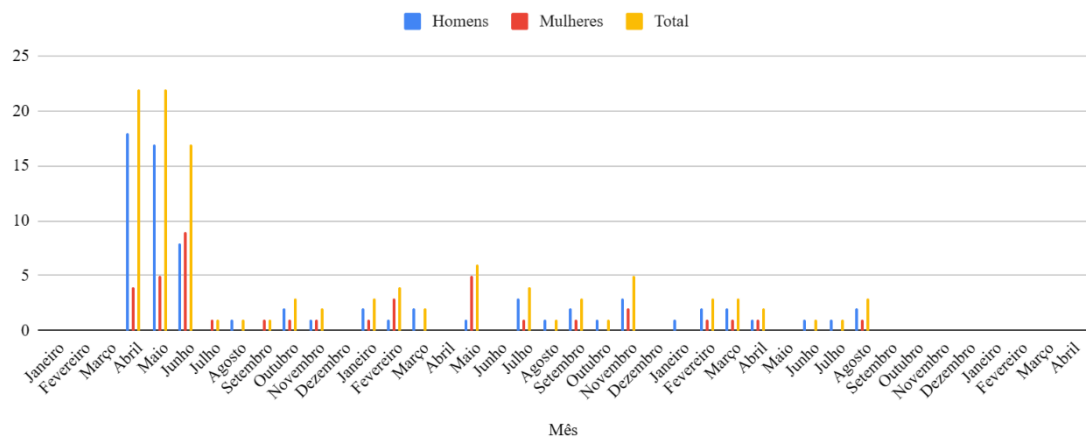


Figure 1. Border crossings to Spain in the Viana do Castelo district.

22004 | Comparative study of the Dress Codes between Portugal and England in the political and social context of the 16th century

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Background & Aim: The purpose of this paper is to study the Sumptuary Laws in the political context of Portugal and England in the 16th century, comparatively, in order to ascertain whether the panorama in which both states found themselves at the time influenced the legislation in force and, consequently, the social order. Textiles and clothing colors have always been seen as a form of social affirmation, used to distinguish classes, trades, among others. The Dress Codes are thus legislation whose function would be to indicate who, and in what context, could or could not use a certain color, fabric or model, thus maintaining the social order characteristic of the time. Since we are dealing with two powers with two very different paths of affirmation and influence (the Protestant Reformation in the English case and the beginning of maritime expansion, in the Portuguese case, mainly) our paper aims to determine the extent to which these external and internal factors had an impact on their functioning and values and how these were reflected in the legislation created. **Methods:** The research will include an analysis of the "Pragmatic Laws" in the Portuguese case and the "Acts of Apparel" in the English case, complemented by the use of iconographic and material sources, such as portraits and clothing from the period, to visually illustrate the data collected. **Results/Conclusions:** We can see how appearance had a central place in the values of a deeply stratified society. In the case of England, the study of the acts created during the reigns of Henry VIII (1509, 1514, 1515 and 1532) and Elizabeth I (1562 and 1574) allows us to understand how the Protestant Reformation, which passed through England in the form of the creation of the Anglican Church (1534), caused differences in the clothing worn. Finally, in the case of Portugal, contact with the Orient, which came from the maritime trade routes, introduced fabrics such as silk to the country.

Keywords: Clothing, Sumptuary Laws, Portugal, England, 16th Century.

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22009 | From the «invention of the Commune» to the «end of all illusions»: former militants of the Movement of Socialist Left and the memory of the Portuguese radical left

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Background & Aim: The Movement of Socialist Left (*Movimento de Esquerda Socialista*, MES, in Portuguese) emerged from the concert between sociopolitical groups who, at the wane of the Portuguese *Estado Novo*, broke with the traditional opposition (Rosas, 2023) and built a new political culture (Cardina, 2010). During the Portuguese Revolution of 1974-76, the ideological plurality within the party led to various ruptures and splits (Ferreira, 2022). The objective of this paper is to recover the memories of the various factions that constituted the Movement and to understand how the memorialistic narratives of former militants are influenced by the post-revolutionary memory regime, which critiques the Revolution (Loff, 2014) and subjects political radicalism to criminalization (Silva & Ferreira, 2019). **Methods:** This work employed discourse analysis techniques concerning the *mémoires* published by former militants, along with a series of interviews with others, in order to grasp the «dissonances between fact and meaning» (Cardina, 2012) through self-writing and oral history. **Results:** The memorialistic narratives of former MES militants tend to reproduce the post-revolutionary memory regime, criticizing revolutionary engagement through three mechanisms: the omission of the relevance of the Movement in individual political biography; its depoliticization; and the division between the initial project and the transformations of the revolutionary process. **Conclusions:** Former MES militants formulate a (self-)critique of radical militancy in the Portuguese Revolution, suppressing the defense of a project of popular power during that time from the idealized continuum between anti-fascist resistance and subsequent political intervention in the corridors of social democracy. Indeed, the «dialogical repositioning» (Silva et al., 2020) is observed among the ex-militants, albeit with differences between those who transitioned immediately to the Socialist Party and the minority who remained in the diffuse space of the unorganized socialist left.

Keywords: Movement of Socialist Left, Radical Left, Portuguese Revolution, Memory Regime.

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22075 | The last elections in colonial Mozambique (1973) - limitations of *colonial marcelism and racial hierarchies of power*

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Background & Aim: In this paper we set out to study the 1973 elections to the Legislative Assembly and the Consultative Council of Mozambique, simultaneously the last elections to internal bodies of the colonial era in Mozambique and the first after the entry into force of the new Organic Law of the Overseas (1972). We see this electoral act as a microcosm of the limitations of the colonial reformism of Marcelo Caetano's government, as well as a clue to the racial hierarchy of power of late Portuguese colonialism on the East African coast. The bibliography on the subject points out that the election of a greater number of African members was not due to a real political change, but rather a change in strategy [1], it also analyzes in detail the process of revising the Organic Law of the Overseas, pointing out the role of the Portuguese settler populations in their attempt to achieve greater autonomy from the European metropolis [2]. **Methods:** We analysed internal documents from the DGS and the Ministry of the Overseas as well as endogenous and exogenous newspapers. **Results/Conclusions:** The over-representation of the communities between "whiteness" and "blackness", i.e., the mixed or Asian communities, as well as their preponderant role among the non-"white" speakers, points to the role they played as an intermediate social stratum between the colonizers and the colonized, in particular the communities that could trace their ancestry to India. In addition, it becomes obvious that the overbearing figure of the Governor-General appointed by Lisbon, who presided over the Legislative Assembly and had almost absolute powers over it, took away credibility and power from the body, summing up the limitations of the overseas autonomy propagated by Caetano. Finally, the attention given to the international coverage of the elections proves that they were part of a global strategy to defend a narrative of a multiracial coexistence in the colonies, the cornerstone of Portuguese foreign policy at the time.

Keywords: Mozambique, Colonial Reformism, Colonial Elections, Racial Hierarchies.

Acknowledgments

I would like to express my sincere gratitude to Professor Conceição Meireles Pereira for her very helpful guidance in carrying out this work as part of the Seminar in Modern History course of the History degree.

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22131 | The armament within D. João de Castro's Tapestries

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Background & Aim: A collection of ten pieces of tapestry made by Bartholomeeus Adriaensz between 1555 and 1560, a Belgian artisan, by request of D. Álvaro de Castro, one of the sons of the illustrious 14th governor and 4th vice-king of the Portuguese Indies, D. João de Castro, as a celebration of his father's achievements and to demonstrate how the son had accompanied his own father, which is demonstrated by the use of their coat of arms present in some of the pieces. Nowadays this collection is located on the "Kunsthistorische Museum Wien" in Vienna. The following work has as its objective the analysis of the armament – offensive and defensive – represented within the ten pieces that form the collection that tells of D. João de Castro's military victories, during the time he was India's vice-king and governor, from 1545 until his death in 1548. Scenes like the siege of Diu as well as the parade made to celebrate his military feats. Throughout the whole collection is "represented" a considerable number of pieces of weaponry used both by and against the Portuguese. **Methods:** Said weaponry was analyzed by working with images found within the previously mentioned catalogue and comparing them with the descriptions and imagery found within the various used works. **Results:** It is understood how the author of said tapestries wished to portray a vast array of different types of weaponry. His intentions could very well be to distinguish which forces, more easily, were Portuguese or Ottoman. One could argue that he also could use the portrayal of certain kinds of armament to demonstrate a certain social hierarchy to the one using it. **Conclusions:** It is the intention of this work to make catalogue and analyze the various types of armament present within said tapestries. Their physical characteristics as well as what their representation by Bartholomeeus Adriaensz means in the context of telling the military deeds of D. João de Castro.

Keywords: Armament, D. João de Castro, Tapestries.

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HISTORY OF ART, HERITAGE, AND CULTURAL STUDIES



Background & Aim: Tattoos are one of the most ancient forms of body art. Despite this fact, both in western and Japanese culture, they tend to be traditionally associated with negative concepts, such as deviant behaviour, immoral conduct and marginality. Using such premise as background, the main objective of the proposed presentation is to analyze the tattoo element as a narratological and symbolic mechanism in Junichiro Tanizaki's short-story *The Tattooer* (1910) and Yasuzo Masumura's film *Irezumi* (1966). **Methods:** It is essential to contextualize these fictional works by exploring the historical periods of nineteenth-century-modern Japan and post Second World War SCAP occupation. Exploring how tattoos are regarded and exposed in each narrative- which derive from the same geographical context and share a common diegetic line- works as a precious contribution to understand how inky body modification was perceived throughout Japan's modernity, period during which they were deeply linked to popular culture and organized crime, thus constituting, simultaneously, objects of fascination and repulsion, inconvenient to be featured in artistic pieces. **Results:** Both *The Tattooer* (Tanizaki, 1910) and *Irezumi* (Masumura, 1966) have as centerpiece of their stories a spider tattoo imprinted on a woman's back against her will by a master tattooer who patiently waited for the perfect canvas to construct his *magnum opus*. Even though Tanizaki wrote the core of each of these narratives, they are very far away from being merely different versions of the equal events and even further from containing the same exact meanings and significations. The way each spider comes to be, operates, and disappears is unique, distinctively influencing the course of the plot and encircling diverse symbolic connotations. **Conclusions:** The tattoo works, in these two cases, as the bridge implying a symbiotic relationship between artist, canvas and creation, blurring the barriers between characters, and confusing them into a shifting but sole identity, highlighting the necessity of the annihilation of the subject through pain, violence and beautification to restore order.

Keywords: Tattoos, Japanese Culture, Interart Studies.

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Francisco in Évora

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Background & Aim: This investigation focuses on the analysis of the *Bone Chapel* of the Church of São Francisco in Évora. This sacred space, now a museum, is part of nine surviving examples of its kind within the national territory, identified in their totality by the art historian Dr. Carlos Veloso. The various religious entities responsible for building such devotional spaces will be identified and will examine how the Franciscan Order established a unique relationship with the city and its population through this sacred space. **Methods:** The qualitative methodology used involves a critical analysis of sources such as the "*Agiologio lusitano dos sanctos, e varoens illustres em virtude do Reino de Portugal*"(1657), among others, along with travel literature and period engravings. Field work was conducted in order to identify the components of the Chapel, analyzing their forms and meanings within the space's program. **Results:** This comprehensive approach allows for a deeper understanding of the symbolism and purposes embedded in the sacred space. **Conclusions:** We will conclude this case study, by providing insights into its use as a space of devotion and the relationship of individuals with it through the seventeen and following centuries, the type of ceremonies that occurred there, and the importance of the human bones, as not only an integral part of the space but as a vehicle for devotion.

Keywords: Bone Chapels; sacred spaces; devotion; Portugal;

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Figure 1: Interior view of the Bone House.

21721 | The Protagonism of Film Architecture: A Study Case of Downton Abbey

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This MA dissertation project aims to explore the relationship between architecture and audiovisual media, and it uses the series Downton Abbey as a case study. This study explores Film Architecture and its role in visual culture through cinema. It raises questions about its definition, development via art direction, the role of real architecture like Highclere Castle, and how these contribute to cinematic architecture. The first stage comprises a literature review on Architecture and Cinema, cinema analysis and theory, and Highclere Castle. The second stage focuses on gathering data on the making of the series Downton Abbey, with a focus on filming locations and art direction. The project will compare the plans of Highclere Castle with a planimetric analysis of the spatiality of the Downton Abbey house. This analysis will be reconstructed using Barreira's methodology [1], which includes four components of the moving image: the profilmic component, the photographic component, the cinematographic component, and the sound component. The final stage of the methodology will be the creation of analysis resources, including plans, sections, architectural and schematic drawings, graphs, and tables. The aim is to comprehend how the various components of the filmic image, along with the gathered information, can help us identify the similarities and differences between the real-built architecture of Highclere Castle and the cinematic architecture of Downton Abbey. This project aims to contribute to the studies of Architecture and Cinema, particularly focusing on Film Architecture and Architectural Visual Culture. The research project aims to create methodologies that combine film analysis with architectural analysis to analyze filmic architectures. Although the project is still ongoing, some differences have already been observed between Highclere Castle and Downton Abbey. Certain elements of the former were used to create a house with a distinct housing scheme.

Keywords: Visual Culture, Film and Television, Film Architecture, Downton Abbey, Highclere Castle.

Acknowledgments

I would like to express my gratitude to my professors and supervisors, Hugo Barreira from FLUP and Luís Urbano from FAUP, for their guidance and support.

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21789 | Perceptions of the Impact of Contemporary Art Museums on Social Development in the Interior of Portugal

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The new currents, positions, and discussions in museology have been focusing on the role and social responsibility that the institution exercises over the community and city where it is located. This issue has become central and energizing to the activities, educational services, exhibitions, missions, and goals of museums worldwide. Furthermore, the need to measure the impact that institutions have is growing, leading to the development of different tools and studies in various contexts. In this sense, the study developed as part of the Master's dissertation in Museology seeks to survey different perceptions of impact on social development in two museums located in the interior of Portugal. The case studies are the Graça Morais Contemporary Art Center, in Bragança and the Cargaleiro Museum in Castelo Branco. The concept of social development is highly complex and overly focused on labor. Therefore, the aim is to understand what kind of social development the museum promotes, whether it is more focused on "economic" and "labor" social development or an "integrated" social development. To achieve the research objective, the methodology is based on documentary analysis of the museums and interviews. Regarding documentary analysis, existing data such as activity plans, the work of educational services, the exhibitions, networking with other cultural facilities are analyzed and cross-referenced with social development diagnoses of the parishes and councils. Through interviews, perceptions of the museums' impact on the community will be outlined, interviewing not only museum professionals but also stakeholders such as museum friends, partners, schools, and others. Although the research is still ongoing and the results are still being developed, it is believed that the research could have a positive impact on museums, especially through perceptions of impact. This could enable institutions to understand how their community perceives their work and how it affects them.

Keywords: Perceptions of Impact, Interior of Portugal, Social Development.

21919 | Study of the collection of bobbin lace in the National Museum of Soares dos Reis and contributions to it

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The study of collections through material culture is a way of critically analyzing museum artifacts and constructing biographies that address their various aspects, such as trajectories, techniques, and meanings. The paths to a collection study converge with museum management, particularly in the creation of the inventory. This is an important stage in the documentation process, as it is a set of standardized principles according to pre-established norms with the aim of organizing, recording, retrieving and making information available. The study developed as part of the academic internship of the Master's in Museology is being carried out in the Portuguese Lace Collection of the Soares dos Reis National Museum (MNSR), which comes from the Industrial and Commercial Museum of Porto, and aims to contribute to the documentation of the collection, specifically the bobbin lace attributed to the Vila do Conde manufacturing center, still active today and important in the history of Portuguese textile know-how. To do this, it was necessary to collect and analyze data through a bibliographic survey and analysis in archives, libraries and institutions, in order to gather information on the formation of the collection and its institutional paths. We also researched bobbin lace through books, workshops, and consultations with experts and bobbin lace makers. The direct contact with the lace, the craftsmanship and the records led to numerous questions, from physical characteristics to fundamental social and gender issues. The consultation with the lace-maker of Vila do Conde was essential to understand the terminologies, typologies, stitches and motifs through a visual and comparative analysis to identify the constituent elements of lace. The research provided the basis for the categorization of the collection to help fill in the inventory forms. Another contribution is the creation of a controlled vocabulary focused on the specifications needed for a more precise study of the lace collection.

Keywords: Study of Collections, Biography, Documentation, Bobbin Lace, Vila Do Conde.

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21925 | The Art of Victory: A Close Look at Fan-Voted Trophy Cups from Sport Lisboa e Benfica's Collection

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Background & Aim: Trophies are symbols that mark victories and preserve the memory of these achievements. For this reason, there are trophies that stand out exemplifying exceptional quality within the decorative arts. However, it is important to note that there is a noticeable lack of research from an art history perspective. The aim of the investigation is to study a group of Trophy Cups within Sport Lisboa e Benfica collection known as “*Taças por Votos*”. Through an analysis of this specific group the study seeks to contextualize them within their historical framework and explore various artistic aspects such as typologies, shapes, materials, techniques, decorative elements, inscriptions, and iconography. Additionally, the investigation aims to document the contemporary process of producing sports trophies, thereby preserving the craftsmanship of this type of metalwork. **Methods:** The sample size consisted of approximately 85 trophy cups, spanning from 1924 to the middle of the 1970s, selected because they present a diverse range of styles, materials, and periods. The methodological approach involved a detailed visual assessment of each trophy and the historical context research involved a thorough review of relevant literature. Furthermore, there were several visits to a workshop to document the entire process from design to production. **Results:** These cups were not won in traditional sporting competitions but through fan voting in a diverse in a wide variety of events. The collection comprises mostly silver pieces showcasing a diversity of styles and techniques, with decorative elements reflecting the cultural styles of their time. The marking analysis provided insights into the materials used, the goldsmiths responsible for production, and the locations where the cups were made. **Conclusions:** In conclusion, this study offers a unique understanding of sporting trophy cups trophies and its metalwork, utilizing the Benfica collection as a focal point for analysis.

Keywords: Trophies, Taças por Votos, Silversmithing, Sports Heritage, Sport Lisboa e Benfica

Acknowledgments

This presentation aims to introduce the ongoing investigation conducted as part of a master's thesis in Art History, Heritage, and Visual Culture during a curricular internship at Sport Lisboa e

Benfica. My thesis is supervised by Dr. Professor Ana Cristina Correia Sousa, coordinator of the master's degree in history of art, Heritage and Visual Culture and co-supervised by Dr. Bárbara Campos Maia, coordinator of the Department of Conservation and Restoration of Sport Lisboa and Benfica.

21974 | Nina Simone – My Baby Just Cares for Me

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This research endeavors to analyze the music video of "My Baby Just Cares for Me" (1987) by Nina Simone, aiming to comprehend the audiovisual elements used in constructing possible narratives, meanings, and references conveyed. Methodologically, the study draws upon the scholarly discourse of Aby Warburg for contextual understanding, followed by an interpretative framework encompassing auditory analysis, lyrical deconstruction, and visual scrutiny. Erwin Panofsky's methodological approach is employed to gather themes associated with Nina Simone, jazz as a music genre, and the "cat jazz bands" concept, which is meticulously curated and systematized for comparative analysis. The analysis reveals a recurrent presence of anthropomorphic characters forming a musical ensemble, reminiscent of vintage animated productions. Despite its monochromatic presentation, the video's aesthetic exudes a nuanced luminosity, juxtaposed with synchronized movements of the feline musicians, engendering an immersive audiovisual experience. In conclusion, this study sheds light on the intricate layers of meaning embedded within the music video, offering insights into its broader cultural significance within visual culture and musical discourse.

Keywords: Nina Simone, Music Video Analysis, Audiovisual elements, Jazz music.

Acknowledgments

Work done in the scope of the subject "Imagem e Contexto II" (second semester of the first year of the MA in History of Art, Heritage and Visual Culture).

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Figure 1: Frame from the music video: Nina Simone - "My Baby Just Cares for Me" (Dir. Peter Lord), 1987

21447 | Under the camera lens, the poetic act: poetry and cinema in Jorge de Sena.

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Background & Aim: Jorge de Sena was, among many things, a cinephile. He wrote comments that span Orson Welles, Billy Wilder, Fritz Lang, David Lean and Vittorio de Sica, as well as keen perceptions of Jean Cocteau's elliptical style or the *reductio ad essentialis* of Chaplin's comedies. And, as expected, he also addressed cinema in his poems. The present oral communication aims to analyze the acute relationship between poetry, cinema and politics in Sena's work, focusing on two examples of this poetic-cinematic bond: the poems *Couraçado Potemkin* and *À memória de Kazantzakis*, derived respectively from the films *Battleship Potemkin* by Sergei Eisenstein, and *Zorba the Greek* by Michael Cacoyannis. **Methods:** It will rely on a detailed analysis of the poems in parallel with reflections inferred from the observation of the films — allied, evidently, with a theoretical framework consistent regarding the themes addressed. **Results:** The poem *Couraçado Potemkin*, in Sena's own words, is a reflection not only of the aesthetic impression he had of the film, recognized by himself as propagandistic, but also a kind of *zeitgeist* of his time. The battleship occupies, narratively, the symbol of the social transformation initiated in Russia in the 20th century, which represented a possibility of a different world. In the poem *À memória de Kazantzakis*, Sena expresses an affection and a debt to the Cretan Kazantzakis, a prolific writer, committed and subject to exile and pilgrimage. **Conclusions:** The great merit and justification of this study are not only to contribute to the specialized criticism of Sena's work on the subject, but also to broaden and stimulate further comparative research between the author's cinema and poetry. Sena is the one who problematizes and historicizes humanity, drawing inspiration from cinema and, in poetry, creates an amalgam of the feelings of himself and his time, bequeathing to us the indelible commitment to consciously fight for times less obscure and oppressive.

Keywords: Poetry, Cinema, Jorge de Sena, Portuguese Poetry.

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me see Portugal with different eyes. Thanks to the Federal University of Ouro Preto, my *alma mater*, and to the University of Porto, which welcomed me as a student on academic mobility.

21655 | Symbolic Affinities: Dining with Alexander Search and Peter Greenaway

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Background & Aim: This paper explores the symbolic ties between Alexander Search, Fernando Pessoa's English heteronym, and Peter Greenaway, a British filmmaker. The objects analysed, Search's *A Very Original Dinner* (1907) and Greenaway's *The Cook, the Thief, His Wife and Her Lover* (1989), reveal tropes that allow for a comparative study between them. This study fosters dialogue through the centrality of the cannibalistic meal and the theme of revenge, emphasizing the characters, the particularities of literature and cinema in terms of the representation, the symbolism of the cannibalistic acts committed, and its consequences. **Methods:** Via bibliographical research focused on theoretical-critical texts, we meant to highlight the points of convergence and those that lead to divergence. Among the bibliographical references which sustain this paper, authors like Elizabeth Janzen (1993), Maria de Lurdes Sampaio (1994), and Keesey Douglas (2006) were fundamental. **Results:** Characters show notorious points of contact between them. The artistic medium sheltering the narratives entuse distinguishable effects on the reader/spectator. **Conclusions:** The cannibalistic setting is more impactful in Greenaway's film than in Search's short story due to its visually heightened and vivid portrayal of raw violence, being less vivid in the short story. Meals can be seen as symbolic representations of decadence and moral degradation of characters while simultaneously operating as metaphors for power and control. In both cases, there is a required distance between the content of the works and the reader/spectator, so that the judgment does not depart from the proposed ethical framework. The characters, placed in a mobile food chain, present a discourse closely linked to consumption, sex, and death, all universal elements of the human condition.

Keywords: Alexander Search, Peter Greenaway, Cannibalism, Revenge, Character.

22124 | Celluloid Metamorphosis: Intermedial Dialogue in the Adaptation of Thierry Jonquet's "Tarantula" to "The Skin I Live In" by Almodóvar

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Challenging the prevailing cultural notion that cinematic adaptations are inherently inferior to their literary source material, we focus on the metamorphoses of Thierry Jonquet's novel "Tarantula" into Pedro Almodóvar's film "The Skin I Live In" that consists in the compaction of 138 pages of content into a two-hour-and-five-minute cinematic experience. This compression, however, does not compromise the depth or complexity of the narrative; instead, the film becomes a rich tapestry of intermedial references, as defined by Irina Rajewsky in her work "Intermediality, Intertextuality, and Remediation: A Literary Perspective on Intermediality" written in 2005, incorporating references of the French plastic artist, Louise Bourgeois, evident through the nuanced body expressions of the actors (as seen on figure 1 and 2) and the deliberate incorporation of scenic elements. By exploring the medial transposition of "Tarantula" into "The Skin Where I Live," through Irina Rajewsky's lens, we emphasize the strategic placement of various works of art within the cinematic masterpiece, further exploring the shared utilization of color in both media, drawing parallels from David Batchelor's "Chromophobia", while delving into the pivotal role of color in conveying and constructing mental and visual scenarios, demonstrating the juxtaposition of disparate elements within a symbolic world serving as a harmonious illustrative purpose, contributing to the creation of a transfigurative dimension within the film. This research challenges preconceived notions about the limitations of cinematic adaptations, demonstrating the potential for enriched intermedial experiences that transcend traditional boundaries while advocating for a more nuanced understanding of their potential to enhance and transfigure source material (re)creating art through time.

Keywords: Intermediality, Intertextuality, Remediation, Literature, Art.

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Figure 1: Still frame from "The Skin I Live In" Almodóvar, 2011

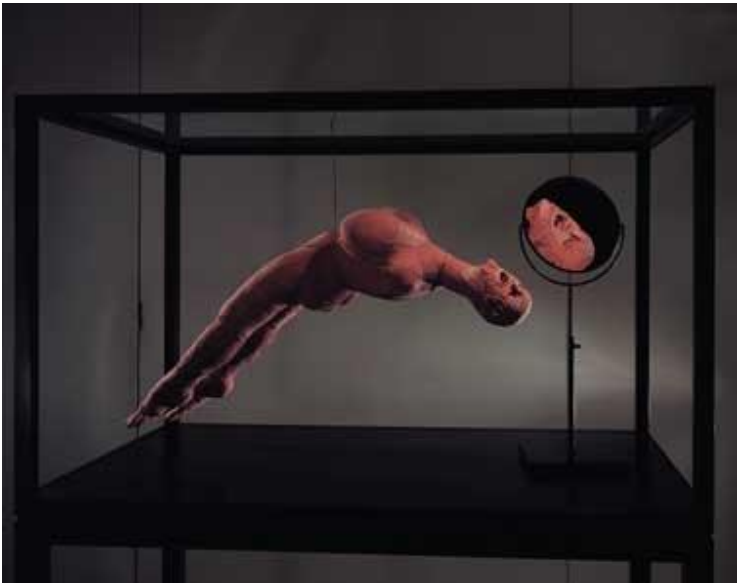


Figure 2: Louise Bourgeois, Arched Figure, 1999

21860 | An Analysis of the City of Braga, as Seen on the “Mapa das Ruas de Braga” from 1750

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This study, as part of a complex project, seeks to capture the extensive historical tapestry of the city of Braga, Portugal, through the lens of art history. This is achieved through the analysis of various historical documents, among which the "Map of the Streets of Braga"⁶ stands out, the core around which this entire project revolves, the basis upon which this analysis is built. This analysis focuses on the medieval architectural heritage of the Primaz das espanhas. For this purpose, a brief contextualization of Braga's medieval identity is created, where the urban fabric takes precedence. From the flow of winding streets, it is possible to observe the facades of 18th-century structures from the perspective of Padre Ricardo da Rocha, who recreates relatively accurately the façades of Braga's houses. Thus, the urban history of medieval Braga is exposed, with notable structures such as the Senate of the Municipality of Braga, the Gate and Tower of Ajuda, and the Houses of Agostinho de Couto, as well as more renowned and important streets, whose pavements are imbued with significant events, or structures of greater value to the Primaz, such as Maximinos street, which was for a long time the city's commercial center, and therefore houses structures of great prestige, such as the aforementioned Senate of the city's Municipality, lost with the march of time, along with many other structures. And it is here, in this loss of heritage, that the Map of the Streets of Braga manifests its undeniable value, because unknowingly, the Priest, who simply captured his city for fiscal purposes, preserved a Braga that is now almost unrecognizable, and thus created a true portal in time.

Keywords: Braga, Medieval, Arquitetura, Cartography, Maps.

⁶ ROCHA, Ricardo, “*Mapa das Ruas de Braga Vol. 1*”, 1989, Arquivo Distrital de Braga; ROCHA, Ricardo, “*Mapa das Ruas de Braga Vol. 2*”, 1989, Arquivo Distrital de Braga.

21869 | Between erudite and vernacular: the constructions methods of Braga through the Mappa das Ruas de Braga (1750)

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Background & Aim: The *Mappa das Ruas de Braga*, a visual survey produced in 1750 under the auspices of the *Cabido da Sé de Braga* for tax management purposes, stands as a rich resource for elucidating the construction methods prevalent in Braga during its time. This paper aims to explore the distinctions between erudite and vernacular architecture depicted in the map, shedding light on their respective characteristics and influences on the urban landscape of eighteenth-century Braga and its contemporary survivals. **Methods** Employing the Mappa as a primary iconographic source, this study undertakes a comprehensive analysis to discern the features of erudite and vernacular architecture. Drawing upon architectural treatises of the period and extant structures, the research methodology involves an examination of architectural elements, materials, and spatial arrangements depicted in the map, contrasting them with the treatises and surviving architectures. **Results:** The examination reveals distinct characteristics defining erudite and vernacular architecture in Braga circa 1750. Erudite structures, influenced by architectural treatises, exhibit advanced techniques and materials, prominently featuring granite constructions with multiple stories, regular stone blocks, and classical elements. In contrast, vernacular architecture emphasizes efficiency and economy, often comprising single-story stone houses or those with a second floor constructed using simpler techniques. **Conclusions:** Through the comparative analysis of erudite and vernacular architecture, this study illuminates their roles in shaping the urban fabric of eighteenth-century Braga and their enduring impact on the contemporary cityscape. While erudite constructions reflect sophistication and adherence to architectural canons, vernacular structures signify pragmatic solutions and adaptation to local conditions. Understanding these dichotomies contributes to a nuanced comprehension of Braga's urban development and its architectural heritage.

Keywords: Mappa Das Ruas De Braga, Architecture of Braga, Vernacular Architecture, Architectural Treatises.

21934 | Iconography of Braga's urban fields and public squares: 16th - 20th centuries.

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Background & Aim: The urban iconography has been the object of constant reflection in the field of art history, architecture, and urbanism, whose studies are explored based on visual representations of the most significant spaces and structures – such as streets, parks, and buildings –, even the designs, functions, and forms that the territory acquires over time. Located in the north of Portugal, the city of Braga is one of the locations with the largest number of historical iconographic sources about its urban evolution, especially because it is governed by an ecclesiastical elite with high economic potential and strong political authority¹. **Methods:** Starting from the study of the *facsimile* “*Mapa das Ruas de Braga de 1750*”², authored by catholic priest Ricardo da Rocha, the present research aimed to analyze the iconography of the fields and public squares in the emblematic city, between the 16th and 20th, with intention of understanding how these spaces were designed, imagined, represented, and used during these times. **Results:** The study examines sources and visual supports, an example of maps and plans, engravings, illustrations, drawings, postcards, and photographs found in different databases and historical records, with the aim of identifying architectural and urban changes, as well as discussing the role of urban iconography in the construction of collective memory and the preservation of heritage. **Conclusions:** Urban iconography transcends the boundaries of time, transmitting narratives that connect the past, present and future of a city. In the case of Braga, when we come across images and drawings of historical events and details, prominent figures, or cultural elements, we are constantly reminded of its collective identity and the value of its cultural heritage.

Keywords: Urban Iconography, Braga, Urban Fields, Public Squares.

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21946 | Lattice (*gelosias*) in Braga Street Map

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This work is part of Braga's architecture and iconography project regarding the Braga Street Map (*Mappa das Ruas de Braga*), a manuscript from 1750. "Gelosias" (referred in this paper as "lattice") are wooden structures placed on windows, which are quite prevalent in the Braga Street Map. The etymology of the word "gelosia" refers to jealousy, from the Italian "geloso", and it is believed that its first use was to hide women from strangers' eyes (*Vocabulário Português e Latino*, 1713). The aim of this work was to meticulously analyze the representation of lattice on the XVIII-century manuscript in order to understand its uses in Braga at that time, considering that only one specimen is found in the city today. In addition to the observation of the Map, research has also been conducted on the history of lattice and its context in Portugal, concluding that there are few studies upon this architectural device. Nevertheless, works such as *Gelosias and naked women: an essay on nudity and landscape* (SILVA, António) and *From tradition to modernity: the reinterpretation of wooden lattice. Reciprocal influences between Brazil and Portugal* (at the 3th International Congress of Luso-brasilien Construction History) have enabled us to understand the different receptions according to the cultural context and confirm that its use persisted in Braga until later than in other countries, which is why it still appears in the studied manuscript. The reason for its use could be both cultural and resourceful. However, a specific example on the Map suggests that these lattice windows could be open, as confirmed in illustrations present on *Architectonic Documentary related to Civil Construction in Brazil* (RODRIGUES, José Wash). This information introduces a new perspective on the dark representation of windows and doors, proposing a hypothesis that Braga's houses weren't as closed to public life as imagined.

Keywords: Lattice (*Gelosia*), Braga Street Map, Architecture, XVIII Century.

21998 | Urban Iconography Project of Braga: The Wayside Crosses and Fountains

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This research aims to trace the history of two types of urban monuments in the city of Braga: its wayside crosses and its fountains. Both forms of architectural structures constitute public monuments, with the former serving as urban marks of Christian devotion and the latter as monumental hydraulic devices. These two types of monuments have specific forms for urban embellishment and serve distinct functions. The methodology employed relied on cartographic sources such as the *Mappa das Ruas de Braga* (1750), a meticulously drawn manuscript delineating the city's street layout, as well as the *Mapa de Bráunio* (1594), *Mapa de Braga de Finais do Século XVII* (ca. 1687), and *Mapa de André Soares* (1756). Additionally, iconographic sources including paintings and photographs from the 19th century onwards were consulted. Points of interest investigated in the research included the commissioning (dating), authorship, and details of the monuments' identification, location, and chronology. The decision to study wayside crosses and hydraulic structures was based on their prominence in the 1750 cartography, contrasting with sparse descriptive references in accompanying texts. Bibliographical research was conducted to corroborate evidence from cartographic and iconographic analysis. The results reveal a complex history for Braga's wayside crosses and fountains. While numerous in the past, few have been preserved to the present day. Many have been replaced by other architectural structures, notably fountains, and have been relocated from their original sites. Additionally, many have been dismantled due to urban reconfigurations, particularly since the late 19th century. An unexpected finding of this research is the intriguing relationship between wayside crosses and fountains. Throughout Braga's history, it was common for wayside crosses to be substituted by fountains, as exemplified by the case of the wayside cross of Campo das Hortas.

Keywords: City of Braga, Urban Iconography, Heritage, Wayside crosses, Fountains.

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LANGUAGES SCIENCES

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17.^a EDIÇÃO

21468 | Linguistic Interaction: A Phonological Study of Guinea-Bissau Creole (Kriol)

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Background & Aim: The aim of this study was to determine a phonological inventory of Guinea-Bissau Creole (Kriol), in order to analyse the influences that Portuguese and Fula, one of the most spoken languages in Guinea-Bissau, have on Kriol. **Methods:** We collected a 207-word list and each word was elicited, both in Kriol and in Fula, with images, from a Guinea-Bissauan informant. These were recorded in professional vocal booths in the Faculty of Arts and Humanities at the University of Porto and were subsequently transcribed phonetically, using the International Phonetic Alphabet. These transcriptions were then aligned and compared with Portuguese and Fula. A phonetic inventory of the language was thus created and a qualitative analysis of phonological occurrences in Kriol was carried out. **Results:** Through the establishment of a phonetic inventory of Kriol, we were able to analyse our data and compare occurrences in Kriol in relation to Portuguese and to Fula and recognise patterns and similarities in the sounds present in each language, thus recognising possible phonological influences on Kriol. We encountered the presence of long vowels in Kriol, indicating a possible influence of Fula. Nasal vowels and the high central unrounded vowel [i] and the near-low central vowel [e] were observed as well, showing a possible influence of Portuguese. The maintenance of the medieval termination [õ] of the contemporary diphthong [ẽw̃], in words such as <chão>, for example, which originated the diphthong [õw̃] in our informant's speech, also signalled a clear interaction with and influence of Portuguese. **Conclusions:** The results of this investigation signal indications of strong linguistic interaction and interference that, in turn, offer an insight into the phonological richness of Kriol. This information is valuable as it allows us not only to understand some of the building blocks of the language, but also its evolution and development.

Keywords: Guinea-Bissau, Fula, Kriol, Creole Languages, Phonology.

21478 | Treasures of Guinea-Bissau: a preliminary study of the Fula language

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Background & Aim: Scholarly attention has, for the most part, been focused on the description of mainstream languages, whereas the scientific description of African languages has been scarce. This study aims to tackle this issue by creating a phonological inventory of Guinea-Bissauan Fula and by investigating the influences of Portuguese and Kriol on Fula. **Methods:** We recorded 207 words in Fula and Kriol, which were elicited through images to limit the extraction of loanwords and other contact-derived phenomena. Our informant was a Guinea-Bissauan woman who speaks the Gabu and Guinea-Conakry varieties of Fula, Kriol, and Portuguese. The words were recorded in professional vocal booths in the Humanities Lab in the Faculty of Arts of the University of Porto. Subsequently, the words were transcribed phonetically, using the International Phonetic Alphabet. All the words were subjected to a qualitative analysis, with the aim of identifying patterns and possible influences that Portuguese and Kriol could exert on Fula. **Results:** Although nasal vowels and the phones [e] and [ɤ] have not been previously recorded in Fula, they were identified throughout our study. It was also possible to identify allophones (non-distinctive contrasts), namely of the phoneme /p/ ([p] occurs in syllable-initial attack position, as opposed to [p:] which seems to occur only in medial and final attack position). Likewise, [r] and [r̥] seem to occur in a complementary distribution, as the former only appears in syllable-initial attack, a context in which the latter never occurs. Three allophones were also identified for the phoneme /l/, namely [l], [l:] and [l̥]. **Conclusions:** An analysis of the phonetic transcriptions allowed for the creation of a phonological inventory of Fula, the study of the distribution of the sounds encountered and a comparison with other existing inventories. Linguistic contact seems to influence the Fula sounds in this speaker, particularly in the production of nasal vowels and the phones [e] and [ɤ].

Keywords: Guinea-Bissau, Fula, Kriol, Language, Phonology.

21488 | Epistolary paths: A historical perspective on the pragmatic-discursive analysis of correspondence between intellectuals

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Background & Aim: Historical Pragmatics is a research area situated in the intersection between Linguistic Pragmatics and Historical Linguistics. The analysis of the text/discourse unit has been sparsely addressed in Historical Linguistics, which has predominantly focused on phonology and lexicon. However, as Barros (2002: 131) suggests, “communication can also be described in terms of pragmatic phenomena concerning past periods”. Considering this, this study aims to depict the evolution of the epistolary genre structures through the comparison of pragmatic-discursive conventions found in correspondence between intellectuals from the 17th and 20th centuries.

Methods: The *corpus* under analysis consists of a compilation of 14 letters from the 17th century exchanged between D. Francisco Manuel de Melo and Duarte Ribeiro de Macedo and 14 letters written by Mário de Sá Carneiro to Fernando Pessoa in the 20th century, which were applied to Seara’s (2006) Interactional Analysis Model of Epistolary Correspondence (AICE). **Results:** Contrary to common belief, epistolary ritualization seems to have become more productive over time, with a wider variety of acts and diversity of expressions and the formal structuring of the letters also appears to have become stricter. **Conclusions:** This study attests that despite the highly personal and heterogeneous nature of the epistolary genre, some level of homogeneity can still be identified. It also highlights the durability of its routine elements, whose persistence has endured and extends up to the present day.

Keywords: Linguistics, Pragmatics, Discourse.

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21531 | Difficulties when Translating Healthcare Research: A Systematic Review

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Background & Aim: Healthcare research translation poses a challenge for most translators since its specificity often requires thorough investigation and some problems seem to occur across languages. Therefore, the aim of the present analysis was to identify the most frequently occurring problems when translating medical research texts. **Methods:** A systematic review of the literature was conducted in 4 databases: MEDLINE, Cochrane Library, Scopus and EBSCOhost. The search was restricted to articles published between 2013-2024, mentioning translation within medical research. Information regarding texts' characterization, methods and translation problems was collected. The PRISMA guidelines were followed [1]. **Results:** Ten studies met the inclusion criteria, comprising 6 original articles and 4 translation students' reports. More than 700 texts were examined in the studies, including 7 languages: English, Portuguese, Spanish, German, Russian, Chinese and Swahili. The most frequently addressed translation issues included concerns related to terminology, abbreviations and acronyms, syntactic over-simplification, text complexity and cultural nuances. **Conclusions:** Despite the recognisable challenge when translating medical information, there seems to be a consensus on which factors most influence the translators' performance. However, care should be taken as, sometimes, patient safety may be at stake due to misinterpretation.

Keywords: Translation, Medical Translation, Research, Difficulties.

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21550 | Anchieta's humanistic grammar: an analysis of Tupi based on the linguistic structures of Latin

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The present work aims to consider how Portuguese influenced the creation of Tupi grammar developed by Father José de Anchieta, bearing in mind that Portuguese language treatises were still largely based on Latin. In this way, it will seek to observe the characteristic structures of Latin, as well as European languages used in the description of the aboriginal language. The presence of a description of cases, sometimes inappropriate for languages such as Portuguese and Tupi themselves, highlights the strong prestige that classical culture still held in the linguistic thought of the 16th century. To do so, the methodology of linguistic historiography proposed by Pierre Swiggers (2012) and Konrad Koerner (2014) will be applied, which points out three principles: contextualization, immanence, and adequacy. **Conclusions:** Anchieta's work presents itself as an effort to, through the linguistic technology developed up to that point, describe a language never seen before. To do so, the Jesuit relies on Latin structures to organize and explain the linguistic phenomena he empirically observed. Thus, it is concluded that classical culture extends overseas and serves as a tool in linguistic contact and description. It is also concluded that Anchieta, in his method, proves to be a true humanist. He brings elements of distinction between languages in his description and seeks to conduct an analysis that values reason. His work stands as one of the few sources regarding the Tupi language, revealing the significant importance of his efforts.

Keywords: Historiography Linguistic, Tupi, Anchieta.

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22024 | The processing of cognates and false cognates in L1 European Portuguese and L2 English speakers: a psycholinguistic study

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The study of lexical representations in bilingual individuals/L2 (second language) learners is a matter of intense debate, as there are divergent conceptions in the literature. On the one hand, there is the theory that views and divides the bilingual lexicon into two individual systems, independent of each other (Potter, So, von Eckardt & Feldman, 1984; Smith, 1997). On the other hand, more recent research highlights the theory that lexical systems suffer mutual interference, thus suggesting an integrated representation of lexical items (Van Heuven, Dijkstra & Grainger, 1998). Considering the theoretical concepts presented, the present study, developed within the scope of the master's dissertation in Linguistics, aims to investigate the processing of words (cognates x false cognates) by L1 (first language) speakers of European Portuguese (PE) who are learning or have learned English (L2). The objective, therefore, is to analyze and compare the levels of proficiency in the L2 regarding lexical access – the identification of cognates and false cognates – and lexical integration in the domain of the sentence and semantic interpretation. Characterized as a *web-based* experiment with 6 possible conditions in a 3X2 design, this study, developed on the PClbex platform (Zehr & Schwarz, 2018), consists of the use of priming and self-paced reading experimental methods. Based on a word/sentence reading task, followed by comprehension questions, the experiment's aim is to evaluate participants' response time (RTs) and lexical judgments. As the research is still ongoing at the time of writing this abstract, the expected results of the study are: **(i)** the most proficient (advanced) speakers are able to separate the L2 from the L1 and, therefore, are able to recognize the difference between cognates and false cognates more easily and quickly and to use them appropriately; **(ii)** less proficient speakers (beginners/intermediates) receive greater interference from the L1 and, consequently, feel more confused in the presence of cognate words and false cognates, taking longer to identify and process them. Above all, the purpose is to understand how lexical access occurs in individuals who are learning or have learned a L2 and to determine whether this access is influenced by the proficiency acquired in the L2.

Keywords: Lexical Access, Second Language Acquisition, Cognates, False Cognates, Priming, Self-Paced Reading.

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22086 | Comparative Analysis of Automotive Terminology and Syntax: Mercedes-Benz's Website Content in European vs. Brazilian Portuguese

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Background & Aim: Existing literature on Portuguese variation has predominantly originated from linguistic perspectives, such as pragmatics, phonetics, phonology, and semantics, with less focus on translation studies, particularly in areas like website localization and technical translation. This study aimed to investigate Portuguese variation through the lens of the said areas of translation, gathering examples to highlight its importance and compiling a glossary for the education and training of future translators. Furthermore, this research intended to serve as a foundation and inspiration for subsequent investigations into the adaptation between EP and BP, especially within technical translation and website localization. **Methods:** This study aimed to explore and summarize the linguistic variations between them by collecting automotive terminologies and syntactic variants from specific car model pages from both EP and BP. Data, captured via screenshots from car models available in both markets, were subsequently categorized—automotive terminologies by their commercial functions and syntactic variants by distinct syntactic categories. These were then systematically arranged in tables, placing EP on the right and BP on the left. **Results:** The findings revealed considerable lexical differences between EP and BP, as anticipated, in automobiles. Identical car components were named differently from Portugal to Brazil, extending even to brand-specific terminologies. Distinct syntax was noted in conjugation, forms of address, and article usage, among others. These disparities underscored the cultural influences on linguistic practices in varieties of the same language and Mercedes-Benz's commitment to website localization for each target market. **Conclusions:** This research underscored the variation between EP and BP in the automobile industry in lexicon and syntax. It emphasized the critical need for multinational brands to recognize cultural and linguistic subtleties to connect meaningfully with diverse audiences. Additionally, future research should devote more focus to exploring the differences between EP and BP in the realms of translation, localization, and adaptation in the area of science and technology.

Keywords: European Portuguese, Brazilian Portuguese, Sociolinguistics, Variation, Localization of Websites.

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LITERATURES AND CULTURES

LJUP
17.^a EDIÇÃO

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Background & Aim: The study of masculinity in Portuguese culture is severely underdeveloped, especially if one focuses only on literature from the Early Modern period. To fill this void, we have been conducting different studies that explore the masculinity constructs in the Portuguese sixteenth century. Due to this scientific emptiness, we have begun by reflecting on masculinity in marriage, one of the most popular societal states at that time. **Methods:** This research focused on the *Contos e Histórias de Proveito e Exemplo*, a collection of short stories by Gonçalo Fernandes Trancoso, published in 1575, although there probably was another undiscovered version published before that year [1]. Since this book is lengthy, we only analyzed two short stories: the *conto* V of the second part, and the *conto* IX of the third part. To understand these masculinity constructs, we compared them to the ideals postulated by sixteenth century Iberian marriage moralists. Since masculine identity is constituted in opposition to women [2], and to every form of alterity, one needs to consider the oppositions that are utilized in the definition of masculinity [3], which, in our case, includes not only the wife, but also unmarried men, for example. For this study, we decided to focus the husband-wife relation, although some important remarks have been made regarding other confrontations. **Results:** This study showed that the masculinity constructs for married men, idealized by the sixteenth century Iberian moralists, influenced the literary masculinities of husbands. **Conclusions:** The «conjugal harmony» of the couple in the *conto* V can only be achieved if both husband and wife assume their respective matrimonial gender roles as they are traced by the moralists. As for the *conto* IX, it is visible that the husband's task of preserving the family's honor, which is always at stake because of the family's women, can be daunting, leading men to impulsiveness.

Keywords: Gender, Marriage, Masculinity, Short Stories, Sixteenth Century.

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21495 | The Classics in Contemporary Portuguese Poetry: outlines of the animal world in Sophia de Mello Breyner Andresen

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Background & Aim: This essay explores the intertwining of ancient Greek texts and Sophia de Mello Breyner Andresen's poetry, with a focus on the symbolic roles of animals. The aim is to not only investigate how classic literature influences nowadays literature, but also to unravel the mythological threads that influence the poet's portrayal of these animals and their significance in both the source texts and Andresen's verses. **Method:** Through a close-reading approach, the analysis begins by examining Andresen's treatment of horses, drawing parallels with characters from the *Iliad*, such as the auriga and centaur. It then shifts to the vulture's war-related symbolism, comparing its presence in the *Iliad* with its portrayal in Sophia's poems. The study also delves into the eagle's representation, linking it to divine messages in Greek mythology and its nuanced role in the exploration of modernity. **Results:** The essay reveals a non-anthropocentric perspective in both literary traditions, emphasizing zoopoetics and the preservation of intrinsic animal attributes without imposing human-centric interpretations. **Conclusions:** Via the analysis of these animal symbols, the essay concludes that Sophia's poetry maintains a delicate balance between Greek mythological influences and a contemporary perspective, fostering a nuanced understanding of the animal kingdom without anthropocentric overlays.

Keywords: Contemporary Poetry, Zoopoetics, Classic Literature.

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21679 | The poem *Syntra* by Luísa Sigeia: Translation and study

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Background & Aim: Luísa Sigeia (1522-1560) was an important humanist woman of the 16th century, who wrote a long poem in Latin entitled *Syntra* (1546), dedicated to Princess Maria of Portugal, daughter of King Manuel I of Portugal. This poem provides both a natural description of Sintra and an apotheosis of the Princess's life. About this Latin composition there is only a French prose translation by Odette Sauvage (1977) and a Portuguese prose translation by Fr. Fiadeiro (1903). The present paper translates the poem *Syntra* from Latin to Portuguese, underlining the importance of Sigeia's text in its literary system and the centrality of two feminine figures in 16th century Portuguese Humanism: the author and her Princess, Maria of Portugal. **Methods:** Due to the assumption that translating poetry into a new literary language ought to be done in verse, the author provided a translation of this poem in a poetic register. The study's approach was both intertextual, in order to highlight the providentialist aspects that it contains and its debt to the matrices of classical antiquity, and contextual, in order to study how this feminine poetical voice claims an important place in Portuguese Humanism. **Results:** Through this translation, *Syntra*, a text known to only a select few due to its lack of academic investigation, gains renewed visibility and importance both for the understanding of Portuguese Humanism or to the perception of women culture in earlier centuries. **Conclusions:** This study leads to consider this poem as an erudite, a complex and a significant work, due to its classical foundations and providential theme, particularly regarding the daughter of King Manuel I of Portugal. In addition, this woman author explicitly manifests an unsuspected and atypical attitude of *auctoritas*, which needs to be considered and highlighted in the context of the history of female culture in the Modern Age.

Keywords: *Syntra*, Luísa Sigeia, Princess Maria of Portugal, Humanism.

21705 | Literature in a Portuguese class: a study case in the A1 level

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Background & Aim: In the foreign language classroom, the integration of Literature in initial levels represents a dynamic and enriching pedagogical approach that transcends mere language instruction. The aim of integrating Literature into foreign language instruction is manifold. Firstly, it provides learners with authentic cultural content, offering insights into the history, values and special norms of the target language's native speakers. By engaging with literary works, students gain a deeper understanding of the cultural contexts in which the language is used, fostering intercultural competence and empathy. Furthermore, literature serves as a potent vehicle for linguistic immersion and skill development. Through the analysis and interpretation of a variety of texts, students enhance their language proficiency across all four skill areas: reading, writing, speaking and listening. **Methods:** This presentation follows on from my internship in Belgium, during the second year of the Master's degree: Portuguese as Foreign/Second Language. The topic I chose to work and investigate was precisely the use of Literature in Portuguese as a foreign language classroom and, in this context, I proposed an activity to be developed in an A1 class. The aim of this lecture is divided into two parts. In the first part, I will try to show the advantages and benefits that the integration of literary texts can bring to foreign languages classes. The second part, a more practical one, aims to analyse the activity script developed during the internship and the results obtained. **Results:** After carrying out the activity, it can be concluded that the results were very positive. **Conclusions:** The integration of Literature in the foreign language classroom represents a dynamic and transformative approach to language instruction. By immersing students in authentic cultural and linguistic contexts, literature fosters empathy, enhances language proficiency and cultivates critical thinking skills, empowering learners to navigate into the complexities of language and culture with confidence and insight.

Keywords: Literature, A1 Level, Foreign Language Class.

21838 | “Everything is Changed, Everything is the Same: Working Class Lives and Gender in Post-World War II England in *Look Back In Anger* and *A Taste of Honey*”

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Background & Aim: This paper concerns the plays *Look Back in Anger* (1956), written by John Osborne, and *A Taste of Honey* (1958), by Shelagh Delaney. Both plays, which were met with an enthusiastic response from audiences, deal with the everyday life of English working-class people and pioneered the kitchen sink realism British cultural movement in drama. In the years since their publication and premiere, some amount of research has been done about these plays and cultural movement: in Osborne’s case, to study the “Angry Young Man” condition in post-WWII England, while in Delaney’s case, to study kitchen sink realism as a legitimate genre. The aim of this paper is to study, through the eyes of Osborne and Delaney, the working-class in post-WWII England, as well, as how these authors approached gender in their respective plays.

Methods: At first, the plays were analyzed from a close reading perspective, to understand what the authors wanted to put on the page. Furthermore, the historical and cultural context were taken in consideration when studying why the plays resonated with the people the authors were trying to portray. Lastly, gender was studied by trying to understand how a male and a female authors wrote about feminism, domesticity, sexual freedom, and sexual orientation. **Results:** Osborne and Delaney approach the working-class condition differently but draw the same conclusions. However, their portrayal of gender issues, particularly femininity, differs enormously. **Conclusions:** Both plays portray the working-class condition, as well as gender differences, transparently, legitimately, and remarkably. Moreover, the kitchen sink realism movement in drama can offer more opportunities for research, since it has not been extensively covered and touches a variety of subjects that are still relevant today.

Keywords: John Osborne, Shelagh Delaney, *Don’t Look Back In Anger*, *A Taste Of Honey*, Kitchen Sink Realism.

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22040 | When passion and delusion collide: a comparative study of selected poems

by Florbela Espanca and Sylvia Plath

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Sharing some biographical coincidences, Florbela Espanca and Sylvia Plath have been the objects of comparative studies [1]. This paper, in particular, aims to delve deeper into the intricate stylistic similitudes bridging these two authors. Given the extent of their literary oeuvres, it was first essential to isolate a theme. The focus of the research was therefore limited to poetry illustrating various sorts of love and simultaneously denoting underlying negative behavioural patterns. Ultimately, the juxtaposition of ten selected poems highlighted numerous convergences. For instance, while some share a closely related opening or a strongly corresponding poetic closure [2], others approach a specific feeling (e.g. disillusionment stemming from an unrequited love) similarly due to creative choices relating to sequencing or semantics. Moreover, there is a recurrent use of natural symbols when conveying abstract concepts through metaphors and personification. Despite relying on a relatively small sample, this paper further demonstrates that several parallels can be drawn between the works of both these authors. Further research could benefit from expanding the corpus to include more of their work alongside their respective diaries and correspondence.

Keywords: Comparative Study, Contemporary Poetry, Florbela Espanca, Sylvia Plath.

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MATHS & ASTRONOMY



Analysis Approach

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Background & Aim: Luxembourg is distinguished by its demographic dynamism among European countries. From 2010 until 2020, around 80% of the population growth was due to migration. The main reason why people immigrate to Luxembourg is labour. Considering this phenomenon, this work examines the different immigrant groups in the labour market from 2014 to 2022 by analysing data from the Labour Force Survey (LFS) of Luxembourg with Symbolic Data Analysis (SDA) [1] techniques. **Methods:** Microdata of the LFS were aggregated and 21 symbolic objects were created based on birthplace and length of residence in Luxembourg e.g. 1.EU. The objects were primarily described by 16 modal variables (multi-valued variables with a frequency attached to each category). Clustering algorithms were applied and the hierarchical clustering using complete linkage and the Chernoff's distance provided the best results. The Heuristic Identification of Noisy Variables (HINoV) algorithm [2] was used to select the variables with maximal clustering information. Finally, the Monitoring the Evolution of Clusters (MEC) framework [3], was used to monitor cluster transitions over time by identifying temporal relations between these structures. **Results:** Six variables were enough to split the objects into groups with similar labour market profiles. Furthermore, it was demonstrated that people from the European Union (EU) and Neighbouring countries have similar profiles while the Portuguese have opposite characteristics. The Luxembourgers are in between. Profiling people from non-EU countries was challenging. Lastly, the MEC framework revealed many movements of the non-EU objects between clusters. **Conclusions:** The Luxembourgish population was split into clusters, and different labour market profiles were identified. The combination of the LFS, SDA and the MEC framework was crucial for achieving the results. Furthermore, it allows the replication of the work in nations that use the LFS, enabling comparison of results and future monitoring.

Keywords: Clustering, Immigration, Labour Force Survey, Luxembourg, Symbolic Data Analysis.

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22056 | Multimorbidity in children: a comparative analysis of distances and methods

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Background & Aim: Multimorbidity, the co-occurrence of 2 or more health conditions, is one of the greatest challenges facing health services. Most studies of multimorbidity pertain to older age groups, and not much is known about multimorbidity at younger ages. This study pertains to children of age 13 and its aim is the identification of mutually exclusive groups of children sharing a similar pattern of multimorbidity. The collected variables consisted of 7 binary variables of morbidities. **Methods:** Three distances (Jaccard, Dice and Anderberg) and 7 clustering methods (hierarchical agglomerative with 4 linkage types - single, complete, ward, average; hierarchical divisive; Partition Around Medoids (PAM); Ordering Points to Identify the Clustering Structure (OPTICS)) were employed. The Calinski–Harabasz index and the average silhouette width were used for choosing the number of clusters. The adjusted Rand Index (aRI) evaluated the agreement among the clustering structures from different methods. **Results:** Most of the methods provided 5 to 6 clusters. The aRI is low (varied between 0.01 and 0.625, with only 4 out of 21 being above 0.5) for different methodologies. **Conclusions:** The most theoretically coherent results were obtained from the hierarchical agglomerative clustering using the Ward and Average linkages with Anderberg distances, the Hierarchical Divisive clustering with either the Jaccard or Anderberg distance, and the PAM method using the Anderberg distance.

Keywords: Clustering, Multimorbidity, Asymmetric Distances.

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21402 | A Study of Columba I

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Background & Aim: The first galaxies that formed are expected to have low masses and residual amounts of metals. The ones that have kept their properties intact since then are likely Ultra-Faint Dwarfs that orbit galaxies like ours. Columba I ($M_v = -4.5$) is a galaxy candidate we believe kept those ancient characteristics, so its study represents a chance to further our knowledge on what happens when galaxies form so early, in the smallest dark matter halos. It is a very faint object, dimmer than a bright star, which posed a challenge to its study as it pushed the limits of modern observing tools. Columba I is expected to be very dark matter dominated, so its study is a possible step forward on figuring out this mysterious element of the universe. **Methods:** We used Spectroscopy from the MUSE Spectrograph in context of the MUSE-Faint survey, which was complemented with photometric data from the Hubble Space Telescope. We ran an open-source code, Spexy, designed to fit model spectra to observed spectra, to extract stellar magnitudes, velocities and metallicities. We adopted assumptions in the literature to model the velocity and metallicity distribution as Gaussians and obtained the parameters of these distributions with Markov Chain Monte Carlo methods. **Results:** The velocities of stars of Columba I have a peak at $\mu_v = 150.59_{-2.98}^{+2.62} \text{ km s}^{-1}$ and a standard deviation of $\sigma_v = 6.23_{-3.68}^{+4.72} \text{ km s}^{-1}$. For metallicities, we obtained $\mu_\xi = -2.17_{-0.16}^{+0.16}$ and $\sigma_\xi = 0.46_{-0.12}^{+0.16}$. Finally, we calculated Columba I's dynamical Mass and made a rough estimate of its stellar Mass, obtaining results of $M_{dyn} = 2.79 \times 10^6 M_\odot$ and $M_\star = 5.30 \times 10^3 M_\odot$, both in solar masses.

Conclusions: Our study goes over Columba I for the first time, adding it to the still low number of Ultra-Faint Dwarfs that have been studied and furthering our knowledge of the most dark matter dominated objects of the universe.

Keywords: Ultra-faint Dwarfs, Galaxies.

21989 | LAEs evolution from cosmic dawn to noon

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Background & Aim: In this research project, we aim to undertake a rigorous and detailed analysis of Lyman- α emitters (LAEs) from redshifts $z \sim 2$ to $z \sim 6$, by using the capabilities of both the Hubble Space Telescope (HST) and the James Webb Space Telescope (JWST). Through this work, we seek to contribute significantly to understanding the pivotal transitions in galaxy morphology and the foundational role of LAEs within the cosmic timeline. **Methods:** This research involves an in-depth examination of LAEs identified within the SC4K survey, as well as candidates proposed through machine learning techniques within this domain. We compare the study of ultraviolet (UV) rest-frame sizes, as observed by the HST, against the optical rest-frame sizes captured by the JWST, with particular emphasis on data derived from the COSMOS-Web and the PRIMER surveys. The morphology of these galaxies is ascertained through meticulous analysis employing established galaxy modelling tools such as SourceExtractor and GALFIT. **Results:** The results indicate that these sources typically display compactness in both the optical and UV rest frames, with dimensions of approximately 2 kpc and 1 kpc, respectively, in physical size. **Conclusions:** LAEs with higher rest-frame equivalent widths of Lyman- α exhibit greater compactness, suggesting a strong correlation between intense Lyman- α emission and increased star-formation rate densities, observed across both optical and UV rest frames. The escape fraction of Lyman- α photons is inclined to be greater within compact LAEs, as the photons are less prone to absorption. The elevated density characteristic of compact LAEs enables more efficient conversion of gas into stars, potentially leading to higher star-formation rates. Our thorough analysis offers new insights into galactic growth during the universe's earliest phases, establishing LAEs as key indicators of initial galactic assembly processes.

Keywords: galaxies, morphology, LAEs, HST, JWST.

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22060 | Boosting Lyman- α Identification and Characterization in the Era of Large Surveys

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Background & Aim: Finding Lyman-alpha emitting galaxies (LAEs) in large numbers usually entails dedicated surveys using custom narrow-band filters. Additionally, as current and future surveys are set to produce huge data volumes, AI-driven decisions are increasingly necessary within the decision-making framework. **Methods:** Our methodology revolves around employing gradient-boosting algorithms trained on data from the COSMOS2020 catalogue (Weaver et al., 2022) and SC4K survey (Sobral et al., 2018) using broadband photometry (magnitudes, fluxes and colors) in the optical and NIR, to augment LAE sample sizes. We construct balanced datasets with similar redshift and i-band distributions to train and test our model. **Results:** We achieve an impressive accuracy and F1-score ranging between ~85-90%. Moreover, our approach enhances model interpretability and data explainability by leveraging feature importances. Our classification model not only effectively separates LAEs from similar generic populations but also demonstrates promise for pre-selecting potential LAEs in forthcoming large-scale surveys like EUCLID or LSST. Furthermore, we delve into the robustness of our model against minor perturbations in the data, a crucial quality measure for machine learning models, as these perturbations may induce classification failures that result in poorer performances. Aside from selecting new potential candidates, we also train regression models to get a first approximation of the overall sample properties (redshift, Ly α line luminosity and equivalent width) with a good performance. Specifically, we achieve a mean absolute error lower than 0.2 for redshift and Ly α line luminosity and smaller than 1.5 for the equivalent width. **Conclusions:** Overall, our approach is efficient in identifying and characterizing LAEs and also facilitates a comprehensive discussion on the fundamental photometric attributes underpinning the study of these galaxies using machine learning and also the limitations inherent in these methodologies and ways to overcome them in a near future.

Keywords: High Redshift, Photometry, Galaxies Surveys and Catalogs, Machine Learning, Supervised Learning from Labeled Data.

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21538 | Exploring TikTok as a catalyst for relational understanding in Mathematics: A study with 7th-grade students

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Background & Aim: Recognizing the presence of social media in students' lives, we aim to leverage their interest in digital platforms to benefit mathematics learning. Current curriculum guidelines for school mathematics in basic education emphasize the relational understanding of mathematical topics and transversal skills, as well as an integrated use of technology to support learning [1]. The notion of relational understanding is not new [2], but it is useful in thinking about how to promote the kind of mathematical understanding envisioned by curricular documents. Relational understanding delves into the reasoning behind mathematical concepts and processes, in contrast to instrumental understanding that primarily focuses on memorized procedures. In this study, we aim at understanding how TikTok can improve students' relational understanding of mathematics [2,3]. **Methods:** This qualitative study focuses on a 7th-grade class and draws from a pedagogical intervention in which students work in groups to create a TikTok addressing various mathematical topics. Each group is asked to highlight essential aspects of the topic and present a challenge related to it. Data is still being collected and it includes students' multimedia productions, field notes from classroom observations, and audio-recordings of classroom collective discussions and of group interviews. **Results:** Initial results revealed significant student engagement, but challenges arose concerning time management and effective group collaboration outside class hours. TikTok videos varied in depth and creativity, with those incorporating examples providing better insights into students' understanding of the topic. **Conclusions:** So far, there are more evidences of instrumental than relational understanding. This may be due to how the topics were presented, lacking explicit encouragement for students to explore the underlying reasoning of the concepts. More care about this aspect is needed, as well as the role of examples in the TikTok itself.

Keywords: Relational Understanding, Instrumental Understanding, Tiktok, Examples.

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PHYSICS

LJUP
17.^a EDIÇÃO

21466 | Optical Configuration for Nitrate Detection in Water Systems

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Background & Aim: Natural resources management is increasing due to the negative impact of humankind's high consumption. Overpopulation and resource scarcity have led to an increase of fishing activity, putting marine ecosystems in jeopardy. Thus, finding sustainable alternative solutions is more crucial now than ever. Aquaculture, both on land and in the sea, helps actively to fight these problems, but it also contributes marine eutrophication by increasing nitrate concentration [1]. Nitrates are essential for the growth of algae and biomass, which can be used for food and sustainable energy sources like biofuels, as an alternative to fossil fuels [1,2]. Hence, it is presented the development of an optical sensor to monitor nitrate levels in aquaculture reservoirs to be implemented in the optimization of biomass production. **Methods:** The sensing system, employing optical spectroscopy, comprises a set of LEDs and photodetectors integrated with a fluidic system through which water flows, enabling continuous measurements of nitrates. Optical absorption of a medium depends on wavelength and on concentration of chemical species [3]. This can be explored and analyzed by the photodiode after the optical signal travels 10mm through the fluidic system. LEDs emitting at 230 and 300nm wavelengths were selected based on nitrates specific absorption characteristics [3]. **Results:** Figure 1 shows the spectrum obtained for several nitrate concentrations. At lower concentrations, there is a more sensitive response observed in the 230nm region. The 300nm region exhibits greater sensitivity as concentration rises, showing potential for using both wavelengths to achieve a broad range for nitrate detection. **Conclusions:** Other wavelengths must be analyzed to detect the presence of other chemical species that share these wavelengths. The optical path length is a big challenge to overcome due to the UV absorption of water. By using UV LEDs, there's a big potential to increase nitrates optical sensor sensitivities.

Keywords: Spectroscopy, Sensor, Nitrates, Ultraviolet, Algae.

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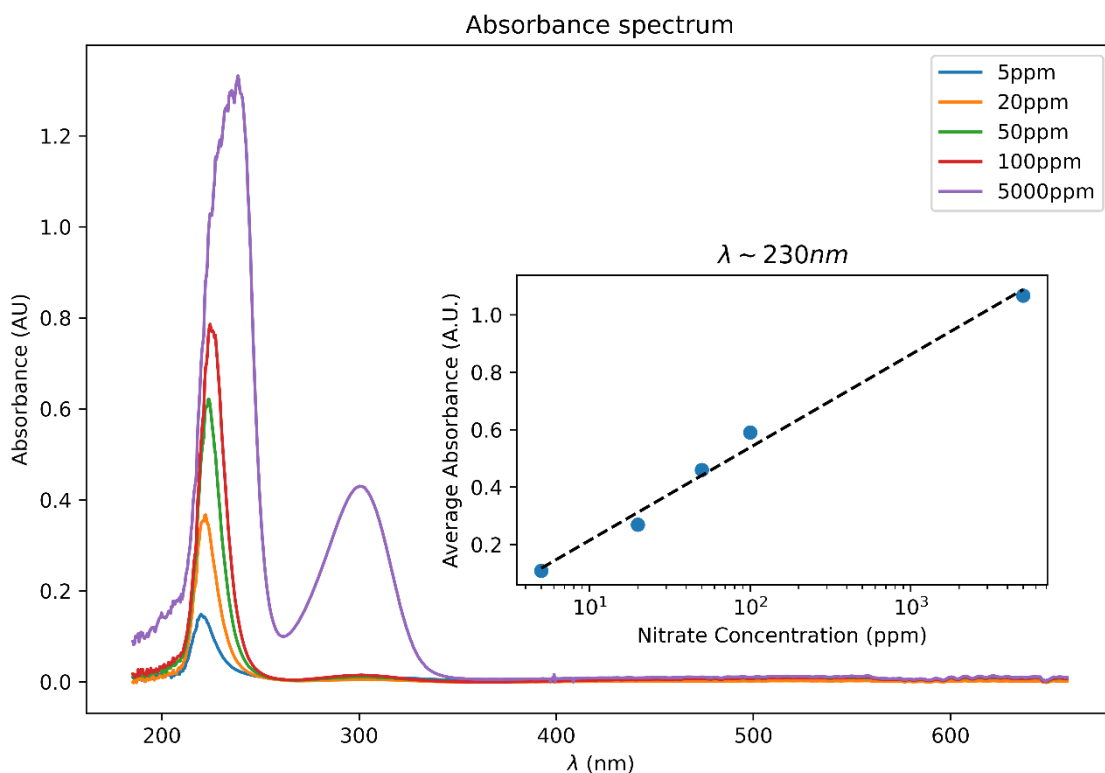


Figure 1: The two major wavelengths absorbed are ~230 and ~300nm. For $\lambda \sim 230\text{nm}$, the average absorbance is given by $\bar{A} = 0.324 \log_{10}(0.779C)$. Sensitivity will increase as concentration decreases.

21576 | Long-Period Fiber Gratings and Fabry-Perot Interferometers for Relative Humidity Fiber Sensing in a Marine Environment

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Background & Aim: Monitoring humidity in concrete structures is crucial for ensuring their durability and structural integrity. Excessive moisture can cause issues such as steel reinforcement corrosion, alkali-silica reaction, and concrete strength deterioration, while insufficient moisture during curing can lead to reduced strength and increased cracking susceptibility. Accurate humidity monitoring optimizes the curing process, mitigating structural damage risks, and extending concrete service time. Traditional capacitive or resistive relative humidity (RH) sensors may suffer from drift, hysteresis, and severe limitations in harsh environments. This project aims to develop optical sensors for RH monitoring during concrete curing stages to support offshore wind turbines and their maintenance. **Methods:** By employing hydrophilic polymeric layers onto optical fiber Fabry–Perot (FP) tips [1] or Long Period Fiber Gratings (LPGs) [2], ambient RH can be determined (Figure 1). As humidity rises, the polymer absorbs moisture, changing the refractive index (RI) towards that of water and causing polymer expansion, affecting the fiber's reflection and transmission spectrum. **Results:** Preliminary testing involved three hydrophilic polymers: a polyurethane based hydrogel, polyethylene glycol (PEG), and polyvinyl alcohol (PVA), within the 1500-1600 nm spectral range. PVA yielded the most promising outcomes, exhibiting greater reliability, albeit still falling short of the 0.5dBm/%RH sensitivity expected for LPGs within the 60 to 100% RH range, as outlined in prior literature [2]. Hydrogel displayed limited efficacy, while PEG exhibited considerable structural instability. Challenges with LPG coating were encountered, meaning that an improved setup is required. **Conclusions:** This work expands the existing literature by exploring other polymers, coating setups and fiber configurations to optimize sensor fabrication and sensitivity. These optical sensors will be integrated into a larger sensing system tailored for harsh environments.

Keywords: Long-Period Fiber Gratings, Fabry–Perot Interferometers, Relative Humidity Sensors, Optical Sensors.

Acknowledgments

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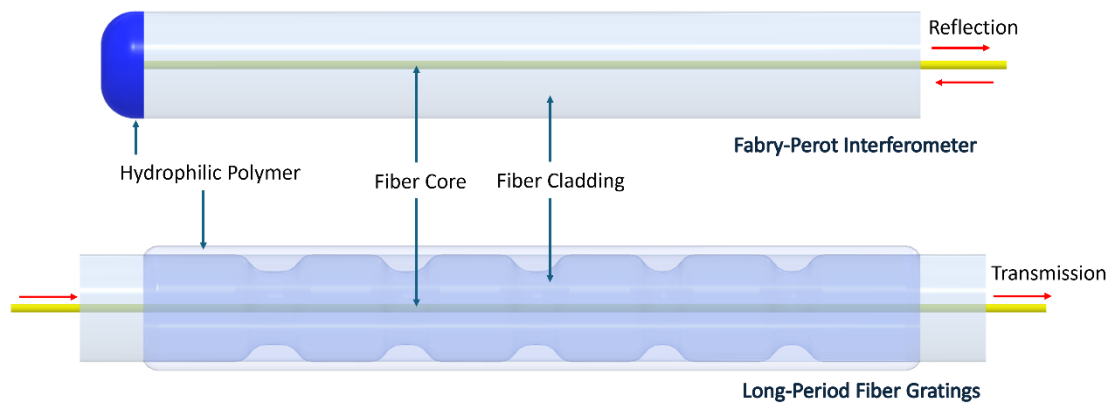


Figure 1: Optical structures used for relative humidity sensing.

21665 | Augmented Reality for Spectral Imaging Applications

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Background & Aim: Spectral imaging is a technique that captures spectral information from a scene and maps it onto a 2D image, featuring the potential to reveal hidden features and properties of objects that are invisible to the human eye, such as elemental and molecular compositions. Augmented reality (AR), on the other hand, is a technology that enhances the perception of reality by superimposing digital information on the physical world. While these technologies have different purposes, they can be considered one and the same in terms of providing an user-centric extension of reality. Spectral imaging provides the information that can reveal the underlying nature of objects, while AR provides the method of visualization that can display the information in an intuitive and interactive way. **Methods:** In this work, we present a novel Unity toolkit that combines spectral imaging and a HoloLens 2 AR device to create an interactive and immersive experience for the user. The toolkit enables the interactive visualization of various elemental maps of a 3D rock model in AR using a simple and intuitive interface. **Results:** With this technique, the user can select a sample model and an elemental map from a preloaded asset library and then see the map projected onto the rock model in AR, using simple interactions such as zoom adjustment, rotation, and pan of the models to explore features and properties in detail. The toolkit offers several advantages, including better contextual interpretation of the spectral data by placing it in relation to the shape and texture of the rock, increased user engagement and curiosity through the creation of a realistic and immersive experience, and ease of decision-making through the provision of comparative tools. **Conclusions:** In short, by combining spectral imaging and AR, we present an innovative approach that can enrich the user experience and expand the user knowledge of the environment.

Keywords: Augmented reality, Spectral imaging, Unity Software

21688 | Is string theory falsifiable?

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Background & Aim: String theory is our best candidate framework for quantizing gravity. Despite its many appealing features, it seems impossible to find de Sitter spacetime solutions in the string “Landscape” of possible low-energy effective field theories (EFTs), one of which could describe our universe. The Swampland conjectures [1,2] are a set of conditions which such EFTs must satisfy to be UV-complete at the Planck scale. **Methods:** We use state-of-the-art cosmological data to constrain string-inspired single scalar EFTs (quintessence [3], the runaway dilaton scenario [4] and the Bekenstein-Sandvik-Barrow-Magueijo model [5]) and test their agreement with the Swampland conditions. We integrate each model’s equations of motion via standard numerical methods and calculate the relevant dimensionless parameters, which according to the conjectures should be of order unity or larger. To constrain these parameters in each model, we use data on the dark energy equation of state, variations of the fine-structure constant, $\Delta\alpha/\alpha$, and experimental constraints on violations of the Weak Equivalence Principle. **Results:** We find that the latter two datasets very strongly constrain models whose scalar field has an exponential potential. Modified versions of the Bekenstein-Sandvik-Barrow-Magueijo model are in incurable tension with the Swampland conjectures, while quintessence and the runaway dilaton scenario require some fine-tuning but are not clearly excluded. **Conclusions:** These results show how astrophysics and cosmology provide the ultimate testbed for the high-energy phenomena predicted by string theory, as well as subtle effects which might manifest even in today’s low-energy universe.

Keywords: Cosmology, Varying Constants, Dark Energy, Scalar Fields, Swampland Conjectures.

Acknowledgments

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21725 | Micro-Grating Structures of Topological Insulator and Gd: A Journey Through Spintronics and Magnetoplasmonics

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Background & Aim: Nonmagnetic semiconductors laid the groundwork for the technical advances of the last few decades. However, they are experiencing a fundamental limit in their performance due to overheating, power dissipation, and the restrictions of miniaturization. This can be overcome by relying on Spintronics, which encompass versatile devices that can employ other fields of physics to improve the efficiency of their magnetization response. Magnetoplasmonics, a field that examines the enhancement of magneto-optical effects through plasmonic resonances, as well as the influence of magnetic fields on plasmon polaritons, stands out among these disciplines [1]. Moreover, the advent of such devices has seen the integration of quantum materials like Topological Insulators, notable for their adjustable plasmonic modes [2]. These materials also demonstrate unique electronic phenomena, such as spin-momentum locking, a feature associated with the production of transverse spin waves [3]. The main objective of this work is to investigate efficient spin-current injection from Gadolinium (Gd) into Bi₂Te₃ [4], facilitated by spin waves that are modulated through magnetoplasmonic phenomena. **Methods:** Fabrication of plasmonic grating structures through thermal nanoimprint lithography, using polymethyl methacrylate as substrate. The grating period of these structures was varied from 600-1600 nm. Gd, Bi₂Te₃ and a heterostructure of these two materials were deposited onto these structures using magneto-sputtering deposition. **Results:** SEM images and XRD measurements will be provided to address structural and morphological properties. The optical spectrum of all the samples will be presented, together with Raman and MOKE data, to study plasmonics phenomena in the samples. **Conclusions:** This is an on-going work. To address the spin-injection and other quantum phenomena, we will later measure the inverse spin hall effect through FMR measurements and magnetoconductance while exciting plasmon modes with a laser of wavelength in the IR regime (1450 nm).

Keywords: Plasmonics, Topological Insulators, Spin-Injection, Nanoimprint Lithography, Spintronics.

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22083 | Development of Optical System and Instrumentation for Turbidity

Monitoring in Algae Tanks

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Background & Aim: Algae biomass holds diverse applications, extending from the pharmaceutical industry to energy production, among others [1]. Thus, maintaining its production sustainability is of utmost significance. Achieving this objective involves embracing practices like reusing water from alternative sources, such as aquaculture [2]. This approach requires continuous monitoring of water quality [3]. The aim of this work is to design an optical system capable of in-situ turbidity measurements. Turbidity measurements present challenges due to their susceptibility to accuracy interference from both particle size and the color of substances in the water. Established approaches to address these problems include employing multiple detectors at different angles to determine particle size and using infrared or multiple color light sources to mitigate the influence of color on the result [4,5]. **Methods:** The constructed prototype comprises a combination of photodetectors and spectrometers positioned at various angles of refraction. This configuration allows the identification of particle sizes and spectral analyses of transmitted and refracted light. **Results:** Preliminary findings, derived from measurements conducted on a set of calibration solutions, indicate that the developed turbidimeter can measure turbidity up to 800 NTU with a precision of 5 NTU. Subsequent measurements will be conducted using solutions with higher turbidity levels to ascertain the upper limit of the turbidimeter's capacity, which should be around 4000 NTU. **Conclusions:** The designed turbidimeter strives to offer a unique capability not commonly found in commercial counterparts—a broad measurement range while maintaining a commendable level of measurement certainty. It also addresses some of the most intricate challenges encountered in turbidity measurements. Consequently, it opens the possibility of monitoring turbidity in natural water environments, where diverse turbidity levels and particles of various colors are prevalent.

Keywords: Turbidity, Optics, Optoelectronics.

Acknowledgments

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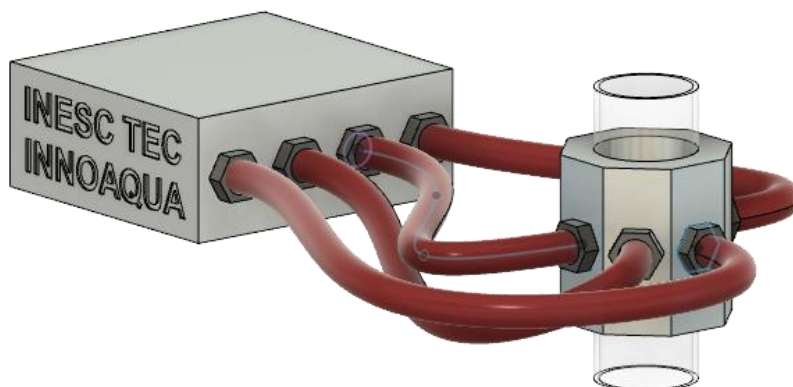


Figure 1: Built turbidimeter.



PSYCHOLOGY AND EDUCATIONAL SCIENCES



21416 | Promoting students' interactions in a 7th grade Mathematics class: Contributions of pedagogical intervention

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Background & Aim: The development of general and mathematical transversal skills is highlighted in current curriculum guidelines for teaching Mathematics [1]. Given the many difficulties shown by my 7th grade students, in the context of my Supervised Teaching Practice experience, in interacting with each other and communicating their ideas, I designed and implemented a pedagogical intervention whose primary goal was to promote students' interactions and to help them develop skills such as conflict resolution, sharing of ideas, and mutual assistance; simultaneously, I targeted the development of mathematical communication skills, in a collaborative environment where students worked in pairs. **Methods:** Following a qualitative and interpretative approach to research, data were collected from field notes, questionnaires, interviews, and other sources including photos of students' work and assessments based on a rubric constructed to assist the pedagogical intervention. **Results:** Students were able to improve the ways in which they interacted and worked in pairs, striving to complete the task at hand with their partners, listen to their opinions and share their own. They developed a better perception of what it entails to work in pairs, becoming more aware of the underlying difficulties and benefits associated with this dynamic. Students also improved their oral communication skills regarding sharing their work with the whole class, recognizing the importance of mathematical communication in this exchange. **Conclusions:** It is important to invest regularly in pair work to foster the development of students' interactions, their ability to engage in collaborative dynamics, and their mathematical communication abilities.

Keywords: Student Interactions, Pair Work, Communication.

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21586 | Youth Experiences of Cyberbullying in Portugal

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Background & Aim: The use of social networks as means of interaction and social communication has grown in the past years, mainly among young people, bringing new opportunities and challenges (references [3]; [5]). Cyberbullying is a pressing problem among young people worldwide. In the Portuguese context, prior to the COVID-19 pandemic, the EU Kids Online 2019 research shows that 23% of people surveyed aged between 9 and 17 had experienced uncomfortable and disturbing situations online in the last year. In lockdown periods, the situation worsened, around 60% of students surveyed aged between 16 and 34 were victims of cyberbullying (reference [1]). The literature reveals the negative impact of the experiences of continued aggression over time on psychosocial, physical and mental health conditions (references [1]; [2]; [4]). In a post-pandemic scenario, the current study aims to bring updated information on this issue by analysing youth experiences of victimisation and perpetuation of cyberbullying while exploring the predictive effect of age, sex, socioeconomic status, attitudes and coping strategies on it. **Methods:** Data collection occurred between June and July 2022 by applying a national online survey to a probabilistic sample of 1262 young people (50.4% male) aged between 11 and 22. Data analytical procedures, including descriptive and regression analysis, were performed in IBM SPSS 26.0. **Results:** This study verify the prevalence of cyberbullying among the Portuguese youth population, although visibly lower than during confinement. Overall, the predictors tested showed a significant effect, even different, on the youth experiences of victimisation and perpetration. **Conclusions:** This study reinforces the need not only to encourage young people to use the formal and informal mechanisms available to them when they are victims of cyberbullying but also provides them with educational opportunities where they can develop individual and social skills against online violence and hate speech.

Keywords: Cyberbullying Victimisation and Perpetration, Youth, Coping Strategies, Digital Citizenship.

Acknowledgments

This work was supported by the Portuguese Government, through the FCT, under the CIIE's strategic funding [grant number UIDB/00167/2020 and UIDP/00167/20

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21843 | "Freedom feels so good!" - The Life Story of a former inmate

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The main aim of this research, realized in the ambit of the curricular unit “Sociology of Education” (LCE), was to analyze the life story of an individual who experienced imprisonment in a prison in the north of Portugal. Relying on contributions from authors from Sociology of Education, we seek to understand how childhood experiences in the family environment influenced his school pathway; his entry into a situation of confinement; and the changes it may have brought to his life. To achieve these objectives, we resort to the biographical method that seeks to listen to life stories in their true essence, reported by those who experienced them (Conde, 1993). We crafted a script for the non-directive interview, transcribed the interview, and developed the biographical narrative for analysis. The interviewee, aged 32, had a period of incarceration spanning from 17 to 25 years old. The narrative analysis shows that he resisted the established school rules, forming a school counterculture with his friends (Willis, 1991). Moreover, his primary socialization, characterized by early exposure to drugs and violence, contributed to the manifestation of deviant behaviours throughout his childhood and adolescence, thus confirming his *habitus* (Bourdieu, 1989). These types of behaviours ultimately led to his arrest, subjecting him to constant surveillance and control during his time in prison, as detailed in the interviewee's biography (Foucault, 1992). However, resisting institutionalized rules demonstrated his agency power (Willis, 1991). Upon his release from prison, he deliberately distanced himself from family members and friends who maintained undesirable behaviours, indicating an awareness of his social position (Freire, 1976). In conclusion, we understand the structural impact of habitus on individuals, yet awareness empowers individuals to challenge the "natural" order of things. Nevertheless, the question remains: to what extent does this awareness facilitate the disruption of social reproduction?

Keywords: Habitus, Prison, Awareness, Biographic Method.

Acknowledgments:

First of all, we would like to thank the interviewee for openly sharing his life story. We also want to thank Professor Marta Sampaio and Sofia Marques da Silva for the assistance provided

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21393 | Eyewitness memory: how recognition is tested, but not the emotional content, matters

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Background & Aim: Eyewitnesses' misidentifications pose a problem to the justice system. Two factors are assumed to contribute to misidentifications: the event's emotional content and the way memory is tested. Studies vary regarding the impact of negative emotion on correct identifications, but a focus on verbal recollection instead of facial recognition may explain these mixed findings. Additionally, the recognition test itself may induce biases, as standard lineup procedures appear to reduce correct identifications. Accordingly, the present study assessed: a) the effect of negative vs. neutral emotion on visual recognition, b) the effect of the type of recognition test (traditional lineup vs. a new pair-evaluation procedure), and c) the interaction between these factors. **Methods:** Participants ($N = 212$) were submitted to a 2x2 between-subjects design, with manipulation of the emotional content and the type of memory test. After watching a video with either negative or neutral content, they were presented with the identification test following a traditional simultaneous lineup (SIM) or the new pair procedure (PAIR). We assessed emotional ratings following after the videos and the proportion of correct identifications of the culprit after a 20-min delay. **Results:** The neutral and negative videos elicited corresponding emotional ratings in the participants. Visual recognition performance did not vary with the emotional valence of the video: neutral ($M = 78\%$) or negative ($M = 77\%$). However, there was an effect of test type: the new pair procedure produced 89.5% of correct identifications against 65.1% for the traditional lineup test (Figure 1). These factors did not interact. **Conclusions:** Results suggest that the nature of the memory test may have a greater influence on identification accuracy than the emotional content of the witnessed event. Our findings suggest that reforming police standards of assessing memory may increase correct identifications.

Keywords: Memory, Emotion, Eyewitness, Lineup, Paired Comparison.

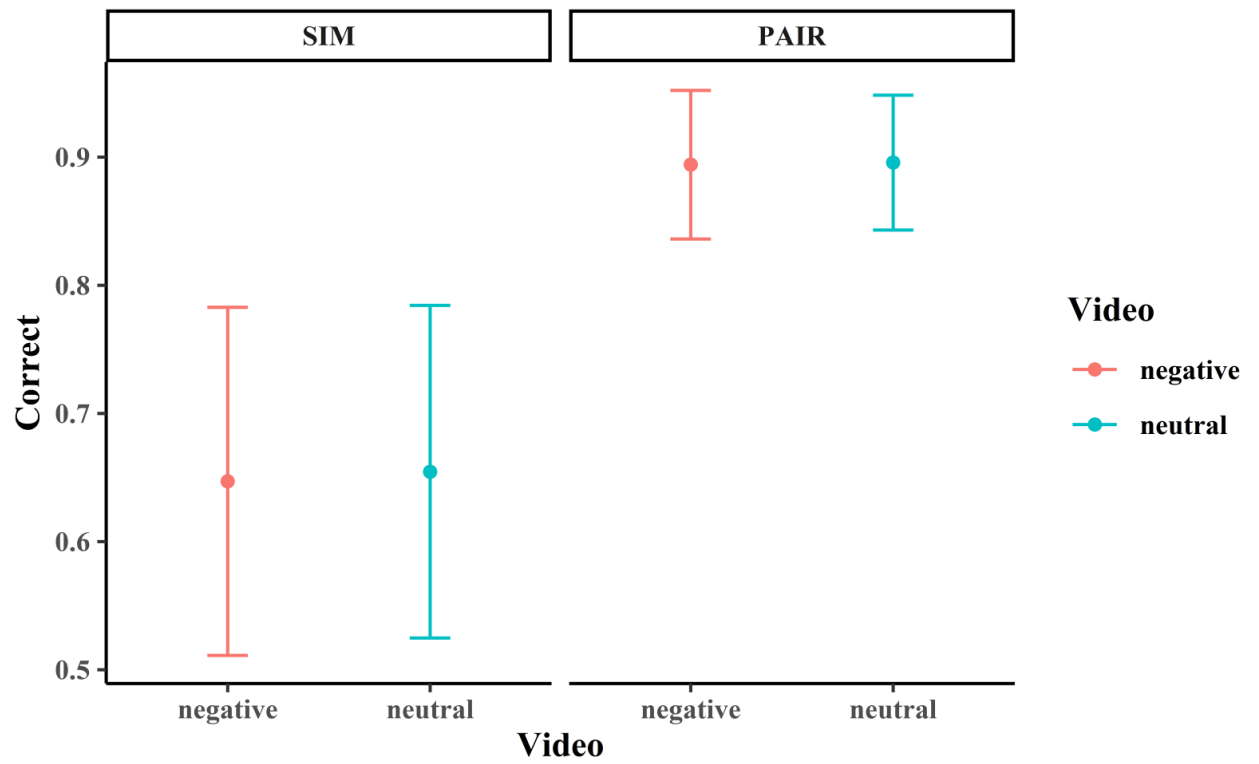


Figure 1. Average Correct Identifications as a function of Memory Test (Simultaneous Lineup, SIM vs. Pair Recognition Procedure, PAIR) and Emotional Content of the Video. Note. Error-bars represent 95% within-subjects confidence intervals.

21394 | Moral Obligation and Social Control Efficacy on Online Collective Action

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Background & Aim: Online collective action against perceived immorality is rising, creating a pressing need to understand what motivates individuals to act online (Agostini & van Zomeren, 2021; Greijdanus et al., 2020). Concerns about the increase in informal punishment behaviours online highlight the importance of distinguishing the processes associated with actions that uphold social order values from those that violate established norms (Loveluck, 2020). The present study aimed to understand the relationship between moral obligation and the motivation to join normative and non-normative online collective action in response to perceived immorality, given the moderating role of perceived social control efficacy. **Methods:** An experimental study was conducted in which effectiveness of social control mechanisms in relation to landlord harassment in Portugal was manipulated. Participants ($N = 148$) were randomly assigned to one of two conditions in which they were told that the measures implemented in Portugal to detect and punish landlord harassment had either not been (ineffective social control condition) or had been effective (effective social control condition). Following the manipulation, participants saw a news headline published on a social media platform about a case of landlord harassment. **Results:** Moral obligation was positively associated with the motivation to engage in both normative and non-normative online collective action. Social control efficacy emerged as a significant moderator only in the relationship between moral obligation and motivation to join non-normative online collective action, with this association being stronger when the social control was ineffective. **Conclusions:** This study highlights the interplay between moral obligation and social control efficacy in shaping online collective responses to perceived immorality. Enhancing social control efficacy while fostering moral obligation can reduce non-normative action whilst promoting normative online collective action.

Keywords: Normative Online Collective Action, Non-Normative Online Collective Action, Social Control, Moral Obligation, Perception of Immorality.

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21418 | Extreme Reactions to Deviance: The impact of Crisis contexts and Deviant's status

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Background & Aim: In a crisis situation, groups may become extremely reactive against those who violate core group values and norms. This study proposes that in a crisis situation, individuals evaluate and react more negatively to behaviours that threaten the group, especially toward high-prestige deviants, compared to medium or low-prestige members. **Methods:** We conducted an experiment (N = 235) manipulating the context of the group (salience of economic crisis vs. control) and the status of the deviant (high vs. medium vs. low). We measured perceived threat, evaluation of the deviant, need for intragroup differentiation, and agreement with reactions to deviance (tolerance, resocialisation, control, vigilantism, and exclusion). **Results:** Results highlight that faced with the salience of an economic crisis situation, individuals become more intolerant towards deviance; also, the presence of a high-status deviant member incites more punitive reactions and a higher need for normative group members to differentiate themselves from non-normative members. In addition, the study examines why group members react informally to deviance and how these reactions relate to the need for intragroup differentiation. **Conclusions:** This research makes a valuable contribution to the existing literature by demonstrating experimentally that the circumstances in which groups find themselves have a significant impact on the behaviour of group members. Specifically, when confronted with a crisis, individuals tend to feel a greater need to differentiate themselves from non-normative members as they perceive an increased threat to the group's reputation. This, in turn, results in a greater desire to take actions of vigilantism to safeguard the group's positive image.

Keywords: Social Identity, Social Control, Deviance, Member's *status*, Subjective Group Dynamics.

21422 | Commitment within university volunteer organizations - a qualitative case study in Já T'Explico

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Background & Aim: The study aims to enhance member commitment within Já T'Explico, a university volunteer organization, as the number of voluntary organizations in the education sector has grown in the past decade¹, often relying on university students². **Methods:** To achieve this, a simple embedded case study design was employed, addressing the following research questions: (RQ1) How do Já T'Explico volunteers perceive leadership style within the organization?; (RQ2) How do Já T'Explico volunteers perceive organizational culture?; (RQ3) How do Já T'Explico volunteers perceive characteristics of the organization's structure? Data were primarily collected through semi-structured focus groups involving volunteers from all four organization departments. Data analysis followed a thematic content analysis approach⁴, facilitated by NVivo 1.7 software (QSR). **Results:** The study found that supportive leadership is prevalent within the organization. Organizational culture primarily focuses on the supported children, but there is dispersion regarding perceived values and ambiguity in the perception of stability or innovation orientation. Concerning structure and decision-making, there is a need for decentralization to bolster commitment, and communication challenges are identified within the organization. **Conclusions:** The primary implication of this work lies in empowering Já T'Explico to navigate crises and address its realities, thereby contributing to the advancement of scientific knowledge regarding youth-managed volunteer organizations.

Keywords: Organizational Commitment, Volunteer Organizations, Leadership.

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21579 | Understanding the retirement anticipation process through the analysis of professional paths: "The Bank at a certain point reminds us that this place is not ours."

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Background & Aim: The present investigation seeks to understand the working conditions faced by older workers during their active years, specifically the challenges associated with aging in the workplace and the transition to early retirement. The primary goal is to understand the events occurring throughout workers' trajectories shedding light on the circumstances leading to early retirement. The study was conducted with 6 former commercial bank employees who opted for early retirement. **Methods:** The qualitative methodology adopted was divided into two phases of investigation: the first involved biographical reconstitution interviews with former bank employees, and the second involved semi-structured interviews with union representatives. This latter phase aimed to enhance the analysis from the perspective of institutions representing workers regarding the working and employment conditions of bank employees. **Results:** The data obtained revealed the gradual decline of the banking profession over time, attributed to profound changes in the type of activities performed, connected with pressure and control, leading to moral dilemmas. These conditions, linked to intensified work, significantly impact the health of workers. Early retirement did not truly emerge as an option for the bank employee, but rather as a possible response to the progressively changing work conditions and their impact on their health and family life. Early retirement in the banking sector is not solely related to normative aging but primarily to the acceleration of this process, driven by adverse and cumulative events faced by the workers. **Conclusions:** In summary, early retirement appears to be more of a constrained choice than an option, determined by the relationship between work and health conditions, as well as family life.

Keywords: Aging at Work, Career Paths, Transition to Retirement, Bank Workers, Constrained Choice.

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Belief

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What are the cognitive mechanisms and social conditions underpinning belief in conspiracy theories? Evidence links conspiracy theories to populism, conflict, violence, and extremism. These can be conceptualized as alternative explanations involving secrecy by groups perceived as powerful and malevolent. Dual-process theories posit that people reason using intuition and deliberation. While intuition is autonomous, deliberation involves cognitive resources. Deliberation has been associated with a decreased belief in conspiracies. However, recent evidence suggests that the role of deliberation is more complex as it can also enhance the coherence of individuals' pre-established beliefs. Additionally, uncertainty is held to be at the heart of various psychosocial phenomena. According to uncertainty reduction theory, people are driven to reduce uncertainty and information-seeking behaviours are a vehicle for attempting to reduce it. Since conspiracies may help address epistemic needs, belief in them can represent a strategy for reducing uncertainty. An experimental study was designed to decipher the complex role of deliberation and its interplay with uncertainty. Participants ($N = 180$) judged how accurate distinct explanations (Moderate vs. Conspiracist) were under different conditions of uncertainty (Control vs. High) and reasoning (Intuition vs. Deliberation). It was expected that participants would believe more in conspiracies when exposed to uncertainty, and that deliberation would reduce belief in them. Compared to intuition, deliberation increased both explanations' accuracy. However, exploratory analysis suggests that those who spent more time deliberating assessed the explanation - only the conspiracist - as less accurate. These findings are discussed in light of dual-process approaches and uncertainty reduction theory.

Keywords: Deliberation, Intuition, Uncertainty, Conspiracy Theories.

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21779 | Online Recruitment In Portugal: The Perspective Of Recruiters

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Background & Aim: The Human Resources field is being strongly influenced by the technological evolution currently underway. One of the most relevant topics is Online Recruitment (OR), a relatively recent approach in the field of Recruitment and Selection (R&S). There is some scarcity in the literature, especially regarding the perspectives of recruiters in Portugal. This study aims to explore and characterize OR in the Portuguese context from the recruiters' perspective.

Methods: Using a qualitative methodology, data collection took place through two focus groups, involving a total of 10 participants from two companies in different sectors. Reflective Thematic Analysis (RTA) was the chosen information analysis technique, resulting in the identification of five main themes and three sub-themes. **Results:** The themes reveal that technology permeates the R&S process from the beginning, involving management software, job websites, and even social media, whose role extends beyond simple job posting. Results also demonstrate the transmission of organizational values by recruiters during the process and the unaltered desired candidate profile in OR. **Conclusions:** This study highlights the increasing normalization of OR, perceived as the future of R&S, while preserving the fundamental objectives of traditional R&S. Thus, it contributes to a deeper understanding of OR utilization in Portugal and the way it is perceived by recruiters, facilitating the demystification and a better understanding of this contemporary R&S method.

Keywords: Online Recruitment, Technology, Recruitment and Selection, Recruiters, Reflective Thematic Analysis.

21878 | Superhero Apprentices – Exploring the Representations of 4th Grade Children about Health and Cancer: Contributions to the Development of a Videogame

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Background & Aim: In Portugal, every year, approximately 400 children are diagnosed with cancer and it remains the leading cause of non-accidental pediatric death. As human capital, investment in a child's health literacy is one of the most effective ways to promote health and reduce health inequalities. Even so, there is little data on children's health literacy levels and their representations of cancer. An adequate developmental understanding of this topic is essential due to the frequency of the disease and its impact on families. The most effective way to promote health literacy is to ensure that health education is an integral part of the curriculum at all levels of education. This requires active and engaging learning strategies, such as serious digital games, for which the child plays a key role in the design process. **Methods:** This study aims to investigate 4th grade children's understanding of health and cancer, share information about the disease and identify the digital game characteristics they value the most, contributing to the development of a videogame. With an exploratory character, framed in a humanistic-interpretative research paradigm and through a mixed methodology, a data collection session was designed with different stages (questionnaires, drawings, stories, games). A total of 234 children aged between 8 and 11 years participated in the study, from 10 public schools in Porto. Data were analyzed through descriptive and thematic analysis. **Results:** Data showed that children had some knowledge, particularly regarding risk factors and impact of the disease. However, there are still misconceptions and fatalistic views of cancer. Relevant suggestions were made for a videogame. **Conclusions:** Future implications of research on the relevance of inclusive dialogue between health and education sectors are discussed. In school we learn to know as well as, inevitably, we learn to be, so the mission of education should also involve being healthy in all its dimensions.

Keywords: Children, Literacy, Representations, Health, Cancer, Serious Games.



Figure 1: Drawing made by a participant.



Figure 2: Drawing made by a participant.

21888 | Facilitating family communication about hereditary cancer risk: The development of a serious game based on design methodology

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Background & Aim: The adaptation to the risk of oncological disease is characterized by a high variability in its expression, potentially causing significant psychological distress. The family plays a crucial role in psychological adjustment to cancer risk, which can be maximized through open communication. However, parents and children report that the communicative process generates anxiety, highlighting the need to support families in this aspect of the psychological adaptation to oncological risk. In the healthcare sector, various serious games have demonstrated a positive impact on physical and psychological health in users with different issues. This research is part of the project PLAY-THE-ODDS, which addresses the challenges faced by this population, aiming to develop a serious game serving as a communication facilitator between parents and children facing the genetic risk of cancer. **Methods:** The research employs a design methodology based on the innovative principles of human-centered design. The game development is part of an iterative process, involving events, workshops, and participatory meetings with experts in various fields and end-users. The diversity of backgrounds in this cocreation network will enhance the quality of the ideation necessary for game development. **Results:** Cocreation meetings and workshops contributed to the identification of the psychological processes the game should stimulate and the mechanisms to operationalize them. Preliminary results also include the cocreation of five game prototypes, refined and condensed into two final versions, whose content and mechanisms will be validated by end-users and other experts. **Conclusions:** The psychological adaptation to hereditary oncological risk within the family poses a multitude of challenges, threatening the mental health of this population. Considering the lack of support, the development of a game facilitating communication between parents and children may produce therapeutic effects in these families.

Keywords: Family Communication, Genetic Cancer Risk.

22132 | Early Childhood Intervention: The Perspective of Families

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Background & Aim: The study explores how families in North Portugal perceive professional practices of Local Early Intervention Teams (LIT) within the Portuguese Nacional System of Early Childhood Intervention (Sistema Nacional de Intervenção Precoce na Infância - SNIPI), fourteen years after the publication of Decree-Law 281/2009. **Methods:** Thirty-five families with children aged 0-6, receiving LIT intervention for at least two years, participated. The research employed a qualitative approach, involving semi-structured interviews. Data analysis utilized content analysis to categorize responses. **Results:** Overall, the findings indicate that many families expressed satisfaction with LIT assistance but noted areas lacking a family-centered approach. Families also highlighted challenges and suggestions for improvement. **Conclusions:** The study offers insights for enhancing Early Childhood Intervention (ECI) services under SNIPI, by incorporating direct family perspectives.

Keywords: Early Childhood Intervention, Family-Centered Practices, Participation.



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21371 | Behavioural regulation and intention to remain in swimming training: an age-group comparison

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Background & Aim: Motivation and persistence to remain in a specific sport may differ in the various stages of the athlete's career [1]. The path to excellence in swimming is a time-consuming process that can lead to behavioural changes on the way. Based on the tenets of Self-Determination Theory [2] and the Theory of Planned Behaviour [3], this study compared motivation and intention to remain in swimming training between different age groups.

Methods: 161 swimmers were framed in age groups as follows: children (n=49, 11.84±0.89 years); youth (n=44, 13.77±0.74 years); junior (n=36, 15.56±0.88 years); and senior (n=32, 19.91±2.4 years). At the beginning of the season, all swimmers were assessed on motivation and intention to remain in swim training by answering the Behavioural Regulation Sport Questionnaire [4] and the intention scale [5]. One-way ANOVA followed by Tukey's post-hoc test and the partial eta squared were computed.

Results: Data showed high levels of self-determined motivation (identified and integrated regulation and intrinsic motivation), a high intention to remain in training, and low levels in less self-determined forms of regulation (amotivation, external and introjected regulation). Older age groups like juniors and seniors showed high levels of amotivation compared to children ($p < 0.01$, $\eta^2_p = 0.12$). Children showed higher levels of integrated regulation than seniors ($p = 0.02$, $\eta^2_p = 0.06$), as well as intrinsic motivation than youth, juniors and seniors ($p < 0.01$, $\eta^2_p = 0.19$). There was also a higher intention ($p < 0.01$, $\eta^2_p = 0.20$) to remain in swimming training shown by the youngest age groups compared to the senior cohort.

Conclusions: Younger swimmers show high motivation and intention to remain in training entering a new competitive season. This approach may be helpful to reduce dropout rates and increase persistence over the season.

Keywords: Motivation, Training, Age Groups, Intention, Swimming.

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21409 | Aquatic motor competence of two young swimmers age groups

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Background & Aim: Aquatic competence defines a generalized proficiency in aquatic skills [1]. Its development can prevent drowning [2] and increase with engagement in aquatic activities [3]. Children involved in competitive swimming should have good aquatic competence, but the influence of age on the learning process is still unknown. This study aimed to compare aquatic motor competence between two age groups of young swimmers within the same competitive level. **Methods:** Thirty-eight male and female swimmers were divided into two age groups: 8-9 years old (G1, n=19; 8.5±0.5 years) and 10-11 years old (G2, n=19; 10.2±0.4 years). In-water testing was carried out in a 25 m swimming pool and comprised a test battery composed of four isolated motor tasks: i) propulsion on the belly ($prop_{belly}$); ii) submersion; iii) dorsal balance; and iv) propulsion on the back ($prop_{back}$). Swimmers were instructed to perform $prop_{belly}$ and $prop_{back}$ with a maximum duration of 2 min. The dorsal balance was performed for 15 s and a maximum distance within 15 m was requested for the submersion. Time was assessed with a chronometer and distance controlled by pre-defined floor marks. An independent t-test or a Mann-Whitney U test was used when appropriate, and Cohen's d or r was selected as an effect size (ES) measure. **Results:** Differences between G1 and G2 were found for $prop_{belly}$ (G1, 56.1±25.3m vs G2, 80.9±7.6 m; p<0.001, ES=1.3), $prop_{back}$ (G1, 57.6±25.1 m vs G2, 79.3±6.7 m; p=0.002, ES=1.2) and submersion (G1, 5.9±2.9 m vs G2, 8.9±3.4 m; p=0.007, ES=0.9). No differences were found for the dorsal balance (G1, 9.7±5.8 s vs G2, 10.6±4.9 s; p=0.734, ES=0.1). **Conclusions:** The aquatic motor competence of young swimmers seems to be defined by age, as older swimmers had greater propulsion and submersion skills. However, both groups performed similarly on the dorsal balance without reaching the maximum score. A larger sample is needed to better understand the effect of swimmers' age on aquatic motor competence.

Keywords: Water Safety, Aquatic Competence, Swimming.

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21513 | The perceptions of youth male football technical coordinators on early specialization

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Background & Aim: Early specialization is characterized by practicing just one sport from an early age, with the aim of improving performance and skills. Despite early specialization is affirmed as a valid and viable route to achieving sporting excellence, it harms long-term development, and several studies point to some negative effects. In football, early specialization is a characteristic of the development pathway. Thus, the present study aims to understand the perceptions of youth male football technical coordinators on early specialization in football, specifically the reasons that lead to it and how positional specialization should take place in player's long-term development. **Methods:** Semi-structured interviews were applied to eight technical coordinators of male youth football from national reference clubs, which were selected based on purposive sampling criteria. A thematic analysis was carried out to scrutinize the data. **Results:** The participants recognized early specialization as a viable path that could lead to high performance levels, and some of them pointed out advantages. However, participants also pointed out the disadvantages of this path, as well as the promoting factors surrounding the player. The positional specialization was seen by most of the interviewees as an approach that should only happen between U14 and U16, due to the demands of the competitive context as well as the biological maturation. **Conclusions:** This study illustrates that although coordinators pointed out disadvantages about early specialization, they are very much in favor of children starting soccer from a very early age, a concept that is very particular to football. These data thus provide relevant information about what is happening in the practice field regarding early specialization and bring to light how positional specialization works in practice, a concept that is very poorly depicted.

Keywords: Early Specialization, Player Development, Football, Soccer, Positional Specialization.

21565 | How to improve training of speed. Analysis of reactive, explosive, mobility and 30 meter sprint

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The sprint events are often the highlight of track and field competitions, drawing attention for the adrenaline they convey and the fascination many have for speed. However, what lies behind those miraculous seconds that can define careers? What characteristics are more closely related to these results, and which are crucial for young athletes with Olympic ambitions? It is based on these questions that we defined the objectives of our study, aiming to identify which motor ability is more determinant in reducing sprint time and which might better predict future success. To achieve our goals, we decided to test a sample composed of two groups: a senior athlete group (Group 1 -> age over 18 years) and a group of young athletes (Group 2 -> age under 18 years). We subjected them to four tests with the aim of measuring different motor abilities. Frontal swings were used to measure hip mobility, repetitive jumps (RJ) for reactive strength index (RSI), and the countermovement jump (CMJ) for explosive strength. Finally, a 30m sprint was conducted to decipher whether any of these motor abilities serves as an explanatory factor for sprint performance and if there are significant differences between groups. After conducting an independent samples ttest with $p < 0.05$, significant differences were found between both groups. CMJ and RJ proved to be effective in improving sprint performance. Additionally, a backward linear regression test was conducted in the overall population and in the different groups. In the population, CMJ and RSI explained sprint performance with $R^2 = 0.861$, while in Group 1, it was CMJ ($R^2 = 0.895$), and in Group 2, it was RSI ($R^2 = 0.772$). Therefore, we observed significant differences in RSI and CMJ between groups, but RSI (reactive strength) emerged as the key factor in identifying talent in young individuals, predicting potential future performance.

Keywords: Speed, Mobility, Reactive Strength, Explosive Strength.

21603 | Positional differences in strength, agility and speed in Basketball

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Due to the demands of the game, it is important for basketballers to develop their physical abilities in order to achieve higher performance levels. However, the literature about the effect of specific basketball positions on physical abilities is surprisingly scarce. We investigated the differences in strength, speed and agility between the specific positions in basketball (guards, forwards and centers). About 14 male U18 basketballers were assessed in three physical tests (20 m sprint, agility t-test and chest pass with medicine ball) and information was collected on their age, height, body mass, years of formal basketball practice. We compared the performance between positions using the Kruskal-Wallis non-parametric test. Our findings showed that (i) centers were taller than guards (mean difference = 0.12 m; $p = 0,022$); (ii) centers and forwards had greater upper limb strength than guards (mean difference = 1.33 cm; $p = 0,033$); (iii) there were no significant differences between guards, forwards and centers in sprint and agility (p 's > 0,05). In conclusion, we find that there were not major differences between positions besides the greater upper limb strength of centers. This study equips coaches with valuable information on position-specific performance variables of their players. This knowledge empowers them to optimize player performance and maximize team success.

Keywords: Physical abilities; Sprint; Youth sports.

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21640 | Parental sport participation, family socioeconomic status, and primary school children sport participation: The REACT study

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Background & Aim: Children's sports participation (SP) plays a key role in their development and health, including obesity prevention [1]. It has been suggested that parental SP significantly impacts their children's SP, encouraging them to be active and instilling sports values [2-4]. Further, socioeconomic status (SES) can also influence a child's SP [5]. Therefore, this study investigates the influence of parental SP and SES on their children's SP. **Methods:** A sample of 540 children (307 girls) aged 6 to 10 years from the REACT study [6] was used. Children and parental SP were obtained via self-reported questionnaires completed by parents. The Portuguese school social support system was used to assess SES, and children were divided into three levels: Level A (low), Level B (medium), and Level C (high). A logistic regression was used to analyze the influence of parental SP and SES on their children's SP, adjusting for sex and age. SPSS v.29 was used with a 5% significance level. **Results:** Children from families with fathers (OR=1.748, p=0.031) and mothers (OR=2.498, p=0.007) participating in sports were more likely to engage in sports. Additionally, children from families with higher SES (level C) were more likely (OR=3.156, p<0.001) to participate in sports compared to those from lower SES families (level A). Yet, no significant difference was observed to level B (p>0.05). Lastly, boys were more likely to participate in sports than girls (OR=2.077, p<0.001), but no significant association was found with age (p>0.05). **Conclusion:** Parental sports participation is highly related to their children's involvement in sports. Further, socioeconomic status also tends to favor children's participation. Programs should be designed, and implemented, to have all families involved in sports practises.

Keywords: Parents' Sports Participation, Children's Sports Participation, Socioeconomic Status, Parental Influence, Childhood.

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21642 | Associations between parental support for physical activity, children' sports participation and health-related physical fitness in primary school children: The REACT study

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Background & Aim: Physical fitness is a childhood health marker [1]. Previous studies showed that parental support for physical activity (SP-PA) can influence youngsters' physical activity levels, affecting their health-related physical fitness (HRPF) [2,3]. Yet, few studies addressed this issue in children. Therefore, we aim to examine how SP-PA and children's sports participation relate to children's HRPF. **Methods:** We sampled 506 children (282 girls) aged 6 to 10 years from the REACT study [4]. Data on SP-PA and children's sports participation were collected via parental self-reported questionnaires. HRPF was objectively assessed with five tests: 50-yard dash, shuttle run, handgrip strength, standing long jump, and pacer using known protocols [4]. A standardized score (z-score) was calculated for each test, and these scores were summed to obtain an overall HRPF z-score (zHRPF). The association between SP-PA, children's sports participation, and zHRPF was analyzed via linear regression, adjusted for sex and age. All analyses were done in SPSS v.29 with a 5% significance level. **Results:** Boys outperformed girls in zHRPF ($\beta=1.47\pm 0.30$, $p<0.001$). Older children were more physically fit ($b=2.85\pm 0.13$, $p<0.001$). A positive association was observed between SP-PA and children's zHRPF ($b=0.11\pm 0.05$, $p=0.021$). However, no significant relationship was found between children's sports participation and zHRPF ($p>0.05$). **Conclusion:** This study confirms that parental support for physical activity is important for children's health-related physical fitness. Hence, developing and implementing well-structured programs to bolster parental support for their children's physical activity could effectively improve their physical fitness.

Keywords: Parental Support; Sports participation; Children; Physical Fitness

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21699 | Motor variability and synergies in young elite basketball players

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Background & Aim: Motor variability refers to different performance patterns caused by the natural variation in postures, movements and muscle activity while performing a repeated task. It is expected that most skilled players demonstrate the capacity to keep variability in a given level of analysis (release parameters of the shot) while maintaining high performance – they demonstrate a compensation strategy usually termed as “task synergy”. Therefore, the aim of this study was to investigate whether elite basketball players do demonstrate such high level of compensation. **Methods:** Eleven adolescent male basketball players aged 13.65 ± 0.44 years, with 6.64 ± 1.91 years of formal training experience, and members of the under-14 regional team of the Porto Basketball Association performed ten free throws while having their movements tracked by motion capture cameras. To analyze their degree of compensation, we evaluated their performance (radial error from the center of the hoop and area of the ellipse at the basket height) considering their actual throws and simulated throws shuffling their release parameters (through a bootstrap procedure, 2000 iterations). Then, we observed how the actual covariation performed relative to other covariation patterns. **Results:** The basketball players showed a radial error of approximately 0.51 m (median) and an ellipse area of 0.88 m². Comparing their release strategies and the shuffled ones, we found that for 7 out of the 11 players (for performance) demonstrated the best covariation pattern possible. Another player showed a pattern better than 98.35% of the simulated shuffles, whilst only 3 basketballers showed poor covariation patterns. **Conclusions:** Our findings demonstrate that, indeed, elite players achieve an impressive capacity to coordinate the many degrees of freedom of the body with the highest degree of functionality.

Keywords: Motor Variability, Free Throw, Youth Players, Basketball.

21732 | The influence of sports participation and physical activity on fundamental movement skills in primary school children: The REACT study.

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Background & Aim: Proficiency in fundamental movement skills (FMS) is important for children's proper motor development which expresses itself in children multifaceted daily tasks [1]. Hence, we examined the links between children's sports participation (SP), their compliance with the World Health Organization's (WHO) moderate-to-vigorous physical activity (MVPA) recommendations, and FMS proficiency levels. **Methods:** The data is from the REACT study [2] includes 561 children (316 girls) aged between 6 and 10, and FMS were assessed with five object control tasks using a new technological device, "Meu Educativo®" [3]. Each task was scored from 1 to 3, and the scores were summed across the five tasks. Physical activity was monitored during a week with the ActiGraph wGT3X-BT accelerometer. Children were categorized as active or inactive based on WHO's MVPA guidelines. [4]. Parents reported their children's SP and were classified as either regularly involved in sports or not. Ordinal logistic regression examined the links between SP, compliance with WHO MVPA guidelines, and children's FMS, controlling for sex and age. Analyses were done with Stata v.14, with a 5% significance level. **Results:** Age, sex, SP, and compliance with WHO guidelines were significantly associated with FMS scores. Boys outperformed girls in FMS (Odds Ratio (OR)=5.48, $p<0.001$). Further, older children were more proficient than their younger peers in their FMS. Children participating in sports (OR=1.99, $p<0.001$) and those adhering to the WHO guidelines had higher FMS scores (OR=2.27, $p<0.001$). **Conclusions:** Participation in sports and moderate-to-vigorous physical activity were significantly associated with FMS proficiency levels. Further, since girls were less proficient than boys, adequate sports participation programs should target them as well as younger children.

Keywords: Sports Participation, Physical Activity, Fundamental Movements Skills, Childhood.

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21866 | Kinematic and efficiency characteristics when swimming butterfly at two different race paces

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Background & Aim: In competitive swimming, butterfly is one of the four conventional swimming techniques, featuring the 50, 100 and 200 m official events. To obtain better performance in different race paces, the importance of better controlling stroke rate and stroke length has been previously demonstrated [1], and the stroke index is a valid indicator for swimming efficiency [2]. Since the 50 and 200 m events require different physiological and technical characteristics, the current study aimed to examine the behaviour of kinematic and efficiency variables in the butterfly technique at two different race paces. **Methods:** Eight female swimmers (26.13±5.46 years, 60.3±5.6 kg and 170.1±3.7 cm) completed 25 m butterfly at maximal intensity and at the swimming 200 m race pace. Two GoPro cameras were used to capture footage in the sagittal plane and a stopwatch to obtain the time at the 25 m. Mean, maximum and minimum velocities, stroke rate, stroke length and stroke index were calculated in a MatLab routine. A paired samples t-test was used to compare variables between the two experimental conditions ($p < 0.05$). **Results:** The maximal intensity presented higher values than the 200 m pace regarding the mean (1.46±0.56 vs. 1.30±0.88 s), maximum (2.15±0.12 vs. 2.02±0.11s) and minimum velocities (0.98±0.19 vs. 0.75±0.08s), as well as stroke rate (55.03±4.73 vs. 43.00±3.54 cycle/min), but lower values regarding stroke length (1.58±0.10 vs. 1.82±0.12 m) [3]. Stroke index values were similar between bouts (2.31±0.13 vs. 2.35±0.22 $m^2 \cdot s^{-1}$). **Conclusions:** With the increase in race pace, there was an increase in mean, maximum and minimum velocities reached, as well as the stroke rate, a decrease in stroke length and a maintenance of the stroke index.

Keywords: Swimming, Paces, Butterfly, Kinematic Variables, Efficiency Variable.

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21964 | The Role of the Coach in the Positive Development of Children and Adolescents through Sport

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Background & Aim: Introducing adolescents into sports context means investing in their moral and ethical development, with significant mental health benefits and less probability of engaging in risky behaviour. Two main theoretical models were used in this study: the Positive Development Model, which defines the concept through 5 dimensions (Competence, Confidence, Connection, Character, and Caring) (1), and the Coach-Athlete Relationship Model, which approaches this relationship in three dimensions (Closeness, Complementarity, and Commitment) (2). In this sense, this study aimed to investigate the importance of the coach-athlete relationship on athletes' positive development and the influence of the gender of the coach. **Methods:** A total of 114 female handball athletes took part in this study, of which 51 were coached by a male ($M = 15.24$ years; $SD = 0.4$) and 63 coached by a female ($M = 14.24$ years; $SD = 1.2$). The study was based on a self-report questionnaire with the following instruments: The Coach-Athlete Relationship Questionnaire (3) and Positive Youth Development Measure (4). The analyses were carried out by sample (female coach vs. male coach). **Results:** Findings suggest differences in the dimensions of the coach-athlete relationship and positive development in the female and male coach samples. In the female coach sample, it was observed that the positive development variables can be explained by the dimensions of the coach-athlete relationship. More specifically, connection was positively predicted by the dimension of complementarity, and competence was positively predicted by proximity and complementarity. **Conclusions:** The coach-athlete relationship is fundamental to the positive development of young people. It should be noted that in the male coach sample, the coach-athlete relationship was not a significant predictor, which may reveal that in this sample, the relationship is not seen as central to positive youth development.

Keywords: Positive Youth Development, Sports Participation, Coach-Athlete Relationship.

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22001 | Velocity variation on national-level double-scull crews

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The rowing cycle is a repetitive action of the upper and lower limbs that produce the propelling force to displace the boat (Cardoso et al., 2021). Intra-cyclic velocity variations are considered detrimental to boat speed, as they can lead to an increase in drag forces (Hofmijster et al., 2007). The current study aimed to assess the sex-related velocity variations in national level double-scull crews. Ten double-scull crews (five female) were assessed during 2000 m race in national official competitions. Boat displacement and velocity were obtained using a wireless unit with a 15Hz GPS and a 3D IMU, containing 12 channel receivers combined with a triaxial accelerometer with a 100 Hz sampling rate (GPSPORT, Canberra, Australia) fixed on the bow of each boat (Fernandes et al., 2021). With a validated self-developed Matlab routine, mean, maximum and minimum velocity (after reaching the maximum), intra-cycle velocity variation, cycle rate, cycle length and technical index, were calculated to assess the sex-related differences in this boat class using an independent-samples t-test ($p \leq 0.05$). Mean \pm SD values of the selected performance variables are displayed on Table 1. Male crews presented higher mean, minimum and maximum velocity, cycle length and technical index but no differences were found on intra-cycle velocity variation and cycle rate. The expected higher anthropometry measures observed in male rowers favors a longer propulsive cycle, helping to displace a longer distance per rowing cycle. The observed differences between sexes are possibly related to the male's ability to produce greater force levels compared to women. Additionally, male crews presented a higher technical index, indicating a more efficient use of their force to propel the boat. Further investigation with greater samples and different boat classes for both genders is required to understand the impact of intra-cyclic velocity variations on rowing performance.

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Table 1. Mean \pm SD values of the selected variables of performance

Variable	Sex	Mean \pm SD	p
Mean velocity (km/h)	M	17.30 \pm 0.43	<0.001
	F	14.62 \pm 0.23	
Maximum velocity (km/h)	M	19.46 \pm 0.85	<0.001
	F	16.88 \pm 0.46	
Minimum velocity (km/h)	M	14.71 \pm 0.65	<0.001
	F	11.79 \pm 0.35	
Intra-cycle velocity variation (km/h)	M	5.00 \pm 1.33	0.73
	F	5.23 \pm 0.66	
Cycle rate (cycles/min))	M	35.93 \pm 1.2	0.18
	F	34.20 \pm 1.37	
Cycle length (m)	M	7.92 \pm 0.19	<0.001
	F	7.13 \pm 0.31	
Technical Index (cycle.m/s ²)	M	38.62 \pm 1.75	<0.001
	F	28.94 \pm 1.47	

22032 | Overall muscle strength can mitigate the adverse effects of smoking on firefighters' lung function

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Background & Aim: Firefighters are exposed to chemical and physical hazards that can impair their lung health, and to physical and mental occupational demands that can encourage tobacco use. We investigated i) the prevalence of smokers, airflow obstruction and restriction, and overall muscle strength/weakness, ii) the effect of smoking on lung function, and iii) the relationship between general muscular strength and lung function in professional firefighters. **Methods:** 68 professional firefighters (ANEPC, Porto District, Portugal) were allocated into three groups (smokers (47.1%; n=32, ex-smokers (11.8%; n=8) and non-smokers (41.2%; n=28), who performed a force spirometry protocol for forced expiratory volume in 1 s (FEV₁), forced vital capacity (FVC), and FEV₁/FVC ratio assessments, and a handgrip strength test for peak values and risk threshold assessment (according to age, height, and gender). **Results:** All groups had FEV₁ and FVC >80% of the predicted value. The FEV₁/FVC ratio was >0.70 for 96.4% of non-smokers (95%CI=0.77 to 0.82; min=0.63; max=0.91), 100% of ex-smokers (0.76 to 0.84; 0.72; 0.88), and for 90.6% of smoking firefighters (0.78 to 0.83; 0.66; 0.88). Preserved ratio impaired spirometry was not identified for any individual. Risk threshold (muscle weakness) was identified in 21.4% of non-smokers, and 25% of ex- and smoking firefighters. ANOVA (factor: smoking; covariate: gender) showed effects of smoking on lung function for FVC ($\eta^2=0.16$; $p=0.01$), FEV₁ ($\eta^2=0.17$; $p=0.007$), peak expiratory flow (PEF; $\eta^2=0.25$; $p<0.001$) and peak handgrip ($\eta^2=0.41$; $p<0.001$). Partial correlations (by gender) showed associations between peak handgrip and FEV₁, %FEV₁, FVC, %FVC, PEF and %PEF ($R^2=0.27$ to 0.48 ; $p<0.001$ to 0.04). **Conclusions:** Despite the detrimental impact of smoking on firefighters' lung function, their overall muscle strength can partially offset this effect. General muscle weakness observed among firefighters indicates a need to think about and revise their training programs.

Keywords: Occupational Health, Firefighters, Physical Fitness, Lung function, Muscular Strength.

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22054 | Towards the understanding of motivation in physical education classes: The role of basic psychological needs and goal achievement motivation

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Background & Aim: Physical education (PE) classes play an essential role in future physical activity (PA) (1). Intrinsic motivation (IM) is associated with higher PA levels and when students are intrinsically motivated for PE, they engage in PA because they find it enjoyable and meaningful (2,3). Motivation is determined by the satisfaction of three basic psychological needs (BPN: competence, autonomy, and socialization) (3). Nonetheless, Achievement Goal Theory (4) states that individuals have two types of goals: mastery/task orientation for learning and improving skills, and ego orientation focused on results. In PE classes, the satisfaction of the BPN and a mastery climate were associated with autonomous IM. Therefore, this study aimed to explore the role of individual and climate achievement goals and satisfaction of BPN on IM for PE (5). **Methods:** 529 students (46.1% females), 10 to 18 years old (M = 14.59) completed the following measures: BREQ-4 (6); BPNSFSE (7); TEOSQ (8); MCSYS (9). The following analyses were used: Spearman correlations to test the association among all the variables; T-tests to analyze the differences between groups of high vs. low IM for PE classes; multiple regression to identify the main predictors of IM for PE. A discriminate analysis was performed to predict low and high IM group membership. **Results:** IM for PE was positively associated with mastery individual and climate orientations, as well as with the satisfaction of the BPN. Significant differences between high and low IM for PE were observed in all the variables. Satisfaction of socialization, mastery goal orientations, sports practice, mastery climate and gender (being male) were positive predictors of IM for PE. The discriminant analysis with these variables correctly classified 71.5 % of the cases. **Conclusions:** Individual and climate goal orientations and the satisfaction of the BPN are essential for IM in PE (5), which suggests that PE teachers should promote mastery climates and the satisfaction of BPN.

Keywords: Physical Education, Intrinsic Motivation, Basic Psychological Needs, Goal Orientations, Motivational Climate.

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22074 | Laterality relationship between the most proficient foot and heading in Football (success assessment, movement pattern and timing)

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Background & Aim: It is established that individuals vary in their capabilities to act with each foot – an effect captured by the term laterality. Preference to act with a specific limb alters overall proficiency in a movement pattern and success in tasks depending on whether the task favors or limits the usage of the preferred limb. The objective of this study is to determine the existence of a relationship between the most proficient foot and the most successful side of the header.

Methods: The sample included 16 male football players who play or have played in Porto FA, Aveiro FA and Braga FA competitions. The participant received 5 crosses from each side of the field with the aim of performing a header and placing the ball into the center of a goal. We evaluated the precision (measured through a scale based on the distance to the main target), timing (ball speed and distance at the moment of attack to the ball) and movement pattern (technical gesture). **Results:** The results showed that precision was higher when the ball was crossed from the side of the less proficient foot compared to the more proficient foot.

Conclusions: In relation to the movement pattern, there were no significant differences in the movement pattern of individuals depending on the heading side, however there is a tendency towards greater compliance of the components on the side of the non-dominant foot. For timing, we found a positive relationship between speed and distance when attacking the ball on the side of the more proficient foot, this was not found on the side of the less proficient foot.

Keywords: Laterality, Football, Heading, More Proficient Foot and Less Proficient Foot.

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22076 | Peer support throughout the athlete's sport participation: a systematic review of literature

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Background & Aim: Peers have been considered an important influence throughout the athlete's development, and, consequently, scientific production on this topic has significantly increased in the last decade. Notwithstanding, there is a lack of systematization of the scientific knowledge concerning the existing empirical research on this topic. Therefore, this study aimed to carry a systematic review of the literature about peer support in sport. **Methods:** Database searches conducted in *Academic Search Complete*, *SPORTDiscus*, *PsychInfo*, *Education Research Complete*, *Web of Knowledge*, *PubMed*, *EBSCO*, *SciELO* and *SCOPUS* lead to 30 empirical articles eligible for analysis. **Results:** The results indicated two different lines of research: a descriptive perspective about the supportive behaviours of peers in sport, and, on the other hand, a perspective focused on the relationship between the type of peer support and the emotional responses of the athlete. The literature suggests friends as important influences for starting and maintaining regular sport participation, while also considering important influences in regulating intrinsic motivation, perceived competence, moral attitudes and emotional athlete welfare. Studies indicate that peers provide positive support as one of the main sources of motivation to initiate and maintain regular sports practice. Nevertheless, the role of these agents changes over time, being particularly important during adolescence. Studies also reveal that the athlete's intrinsic motivation is enhanced when peers adopt behaviours such as collaboration and interpersonal competition, evaluative feedback, or positive reinforcement regarding the athlete's performance in training and games, which will influence other relevant aspects of practice. **Conclusions:** Besides offering a view of the literature on the peer support in sport, this article identified potential methodological fragilities and suggested avenues to explore in future studies.

Keywords: Peers, Social Support, Social Influences, Athlete Development, Systematic Review.

22097 | Motivational Factors and Physical Activity Behaviours: Exploring Self-Determination Theory in Adults from the Northeast of Portugal

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Background & Aim: Despite the known benefits and consequences of physical activity (PA), a significant portion of the population fails to meet recommended levels (1), investigating motivational factors in specific contexts is crucial (2). Therefore, the purpose of this study was to explore the relationships between Self-Determination Theory, adults' intentions, and decisions towards moderate to vigorous activity (MVPA), and those who have met and have not met the WHO recommendations for weekly MVPA. **Methods:** A sample of 186 participants (130 females and 56 males, 50.2 ± 10.6 years old) from northeast of Portugal took part in this study. Based on their total minutes of MVPA per week and WHO recommendations, they were divided in 3 groups: G1-did not meet (n=89), G2- did 150-299 min (n=43) and G3- did +300 min (n=54). Participants completed the following measures: IPAQ-SF (3), BREQ-4 (4), BPNES (5), Intentionality of being physically active (6), Stages of Change (SF) and DBSE scales (7). The following analyses were used: T-tests and ANOVA to determine differences between sexes and PA groups, respectively, and Spearman correlations to test the association among PA levels and the other variables. **Results:** There were no significant differences in all motivational orientations (except external regulations), needs' satisfaction, intentions and decisional balance variables. Significant differences were found variables among the PA recommendations' groups for the same variables, Participants who didn't meet the weekly PA recommendations (G1) showed significantly lower levels of autonomy, competence and socialization satisfaction; introjected, identified and integrated regulations, intrinsic motivation (IM), and intentions, than G3 and G2 (but not significant). Stronger correlations were found between levels of MVPA, and autonomous regulations, IM and needs' satisfaction. **Conclusions:** Needs satisfaction and more self-regulated and intrinsic Motivation could help individuals to engage in physical activity.

Keywords: Physical Activity Recommendations, Basic Psychological Needs, Self-Determination, Motivation.

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POSTER SESSIONS



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21614 | Fighting fire with fire: Can Biological Control Agents (BCAs) be useful in the fight against fire blight disease?

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Background & Aim: *Erwinia amylovora* is the etiological agent of fire blight disease, which affects apple and pear tree hosts and has the potential to devastate entire production fields in a single season. In Portugal, it endangers the production of the economically valuable pear cultivar 'Rocha', leading to unbearable economic losses. Symptoms include bacterial exudate formation and leaves browning, giving plants the burnt-like appearance characteristic of fire blight. However, an ever-increasing global interest in sustainable agricultural practices, coupled with tightened restrictions on antibiotics and chemicals, has led to a lack of available control methods. Thus, biological control agents (BCAs) may be the key to controlling fire blight disease, providing a green control solution, without the adverse toxic effects associated with antibiotics or copper compounds. BCA's bioactivity relies on several mechanisms, namely through the production of antibiotics or enzymes, competing for essential nutrients, and/or by stimulating the plant's natural defenses. This study aims to identify and characterize the activity of bacterial isolates as potential new BCAs for the control of *E. amylovora*. **Methods:** Bacterial isolates were recovered from *E. amylovora*-infected orchards and identified using 16s primers. The potential antagonistic activity of the bacterial isolates was evaluated via an *in vitro* cross-streak antagonistic assay conducted against 3 *E. amylovora* strains: the type strain LMG 2024, and two Portuguese strains, Ea 680 and Ea 630 (with low and high virulence, respectively). **Results:** From 60 plant samples, a collection of 420 microorganisms was obtained, with 190 identified as bacteria. Early results of the cross-streak antagonistic assays suggest antagonistic activity of some bacterial isolates against *E. amylovora* strains. **Conclusions:** This work highlights the potential of BCAs, suggesting that some bacterial isolates could be used as a control method against fire blight.

Keywords: Fire Blight, *Erwinia Amylovora*, Biological Control Agent, BCA.

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21694 | Unravelling phytohormones mediated responses against *Phyllosticta ampellicida* in grapevine

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Background & Aim: Phytohormones are essential molecules naturally present in plants that are part of the complex signaling networks that regulate diverse metabolic processes, playing an important role in defense against (a)biotic stress. *Phyllosticta ampellicida* is an ascomycete responsible for the grapevine black rot disease. This phytopathogen causes substantial losses in grape and wine production. The primary goal of this study was to characterize the metabolic profile of *Vitis vinifera* var. 'Touriga Nacional', one of the most economically relevant Portuguese grape varieties. **Methods:** Leaf samples were collected from three vineyards located in the Região Demarcada do Douro and five biological replicates were obtained from asymptomatic grapevines and five more from plants that showed clear signs of the disease. The presence of *P. ampellicida* in symptomatic plants was confirmed by PCR using specific primers. Phytohormones were extracted and then quantified using HPLC-DAD. Ten phytohormones were analysed: *trans*-Zeatin (*tZ*), gibberellic acid 3 (GA₃), 6-BA (6-benzyladenine), indole-3-acetic acid (IAA), salicylic acid (SA), abscisic acid (ABA), indole-3-butyric acid (IBA), jasmonic acid (JA), methyl salicylate (MeSA) and methyl jasmonate (MeJA). **Results:** It was found that the levels of GA₃ and *tZ* significantly decreased in symptomatic plants compared to the asymptomatic plants. On the other hand, the levels of JA, and particularly MeJA, increased in the symptomatic plants. **Conclusions:** These findings indicate that the plant's defense mechanisms against this pathogen primarily involves a JA-mediated defense pathway. It also reveals an antagonistic interplay between GA₃ and *tZ* against JA, likely suppressing GA-mediated routes and ABA signaling pathways while activating defense genes. Additionally, elevated levels of MeJA suggest the activation of plant defense in distal tissues. Unraveling the mechanisms by which plants protect themselves from diseases, paves the way for the creation of innovative strategies to effectively manage plant diseases.

Keywords: Plant protection, Phytohormones, *Vitis vinifera*, *Phyllosticta ampellicida*.

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21715 | Coffee silverskin as a prebiotic substrate for *Lacticaseibacillus paracasei* subsp. *paracasei*

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Background & Aim: The process of transforming the coffee fruit into a ready-to-drink brew produces a large amount of by-products including pulp, husks, mucilage, parchment, defective beans, silverskin, and spent coffee grounds, which cause environmental concerns if discarded improperly [1]. In turn, these by-products have a high nutritional value and can promote different health benefits [2]. Previous studies indicate that compounds found in coffee and its by-products, such as chlorogenic acids, melanoidins, and oligosaccharides, have the ability to promote gut health by proliferating beneficial bacteria and inhibiting pathogen growth, making them promising candidates as prebiotic ingredients [1,2,3]. The aim of this study was to evaluate the chemical composition of coffee silverskin and its prebiotic activity. **Methods:** The sample was kindly provided by a national coffee importer and roaster company (JMV-José Maria Vieira, SA). The following parameters were determined: protein, lipids, ash, and dietary fiber (total, insoluble, and soluble) contents by AOAC methods [4]; chlorogenic acid profile and caffeine by RP-HPLC-DAD [2]; evaluation of *Lacticaseibacillus paracasei* subsp. *paracasei* growth after 24h of incubation with silverskin (in different concentrations) by plating serial dilutions on MRS agar. **Results:** The results show that silverskin had a high dietary fiber content (65.87% dw), mainly insoluble one (56.86% dw). The main chlorogenic acid found in silverskin was 5-caffeoylquinic acid (52.53 mg/100g dw). Silverskin exhibited the ability to stimulate the growth of *L. paracasei* subsp. *paracasei* in a dose-dependent manner. A similar growth was observed for 16% silverskin and 2% fructooligosaccharides (well-established prebiotic) (m/v). **Conclusions:** In conclusion, the chemical composition of silverskin, characterized by its abundance in dietary fiber and chlorogenic acids, suggests that it could be explored as a prebiotic. In fact, silverskin can be metabolized by probiotic, meeting the prebiotic criteria.

Keywords: Coffee By-Products, Probiotic Bacteria, Dietary Fiber.

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21741 | Exploring the involvement of YUCCA-mediated auxin biosynthesis in

Olea europaea L. somatic embryogenesis

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Background & Aim: *Olea europaea* L. is the most valuable oil crop in the Mediterranean basin, with Portugal being one of the leading European producers of olive-based products. Somatic embryogenesis (SE), an *in vitro* regeneration system that relies on the totipotency of plant cells, is the preferred method for mass propagation, germplasm conservation, and genetic improvement of woody plants [1]. Although much progress has been accomplished in olive SE, its applicability is still limited, partly due to the scarce knowledge of the fundamental mechanisms regulating this process [2]. The morphogenic hormone indole-3-acetic acid (IAA), generally synthesized through a route dependent on YUCCA (YUC) flavin monooxygenase (FMO) enzymes, has been recognized as a key growth regulator in SE [3]. Thus, this work aims to address the role of YUC-mediated auxin biosynthesis in the differentiation stage of olive SE. **Methods:** For that, the *OeYUC* gene family members were identified and characterized *in silico*. A highly efficient olive somatic embryogenic line was established *in vitro* using mature zygotic embryos of cv. ‘Galega vulgar’. This line will be used for gene expression analysis through RT-qPCR to identify the most responsive *OeYUC* genes. To fundament the involvement of *OeYUCs* in SE, an experiment will be performed by inoculating the line in a culture medium containing the YUC enzymatic inhibitor 4-phenoxyphenylboronic acid (PPBo) [4]. The effects will be evaluated by the changes in the number of differentiated somatic embryos and their stage of development. Additionally, an immunohistochemical analysis will be performed to localize the IAA in olive embryogenic tissues. **Results:** Twenty-four *YUCs* were identified for the first time in the olive genome. **Conclusions:** The acquired knowledge will be useful to improve the protocols for enhanced embryo productivity in agronomically interesting olive cultivars while opening future possibilities for biotechnological applications in olive improvement.

Keywords: Vegetative Propagation, Differentiation, Morphogenesis, Indole-3-Acetic Acid.

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21759 | Olive Oil Authenticity: Uncovering deceptive practices and uninformed consumers

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Background & Aim: The olive oil market is currently struggling with significant challenges, marked by unprecedented price surges resulting from shorter productions in the past two campaigns. This situation has created an environment for counterfeit activities. The primary objective of this project was to investigate the prevalence of adulterated and misclassified olive oil samples obtained from sources outside regulated markets. **Methods:** Active participation from the academic community of the Faculty of Pharmacy was sought for this project, developed within a curricular unit of Pharmaceutical Sciences. The initiative resulted in the collection of more than 30 samples, all purchased as “extra virgin olive oil”. Parameters assessed, in accordance with international guidelines, included free acidity and ultraviolet spectrophotometric analysis to verify the olive oil category. Additionally, both fatty acid and vitamin E profiles were examined for authenticity. **Results:** The study revealed that over half of the samples were non-authentic. Even among those named as authentic, the majority failed to meet the specifications for the extra virgin category. Notably, the identified frauds were associated with the addition of substantial amounts of vegetable oils and, in some instances, not meeting criteria for human consumption, raising doubts on their source. Additionally, some samples were correctly labeled as mixtures of vegetable oils with olive oil, but consumers were not aware. **Conclusions:** The findings underscore the current challenges faced by both consumers and producers. Consumers struggle to discern the authenticity of their purchases, assuming them to be genuine. This highlights the critical need for increased market control and emphasizes the imperative for consumers to develop the ability to interpret label information, enabling them to make informed choices.

Keywords: Olive Oil, Authenticity, Quality Control.

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21816 | Valorisation of *Fagus sylvatica* L. nuts: Insights into fatty acid and vitamin E composition

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Background & Aim: Characterizing the nutritional composition of undervalued foods provides essential information for assessing potential health benefits and aids in identifying novel sources of specific nutrients, contributing to dietary diversity and sustainability. So far, only a few studies have described the nutritional profile of the oil obtained from the nuts of *Fagus sylvatica* L., also known as common beech. Therefore, this study uses advanced chromatography to characterize *Fagus sylvatica* L. nuts lipids. **Methods:** Wild beech nuts were gathered in 2023 from 16 regions in León, Palencia, and Burgos (Spain). Lipids were extracted in duplicate (N = 32) with petroleum ether (40-60°C, fortified with BHT), in Soxhlet devices. The fatty acid and vitamin E profiles were evaluated by gas and liquid chromatography, respectively [1]. **Results:** The total fat content of the dried fruits ranged from 7 to 28%, primarily consisting of unsaturated fatty acids (av. 87.8%), with a prevalence of oleic and linolenic acids (37.4% and 37.3%, respectively), and low amounts of saturated fatty acids (average of 12%). These lipids are also abundant in vitamin E, with a total content ranging from 35 to 63 mg/100g, providing lipid protection against oxidation. The dominant forms of vitamin E were γ -tocopherol (54-86%) and δ -tocopherol (12-46%), with minimal amounts of α -tocopherol (1-6%). **Conclusions:** This study yielded favorable outcomes and optimistic prospects, endorsing the utilization of *Fagus sylvatica* L. nuts for oil production, a practice with historical roots [2], and suggesting their applicability for various other purposes. Also, this characterization gives more information about the fatty acids and vitamin E content of these nuts and allows a better understanding of their potential.

Keywords: *Fagus Sylvatica*, Vitamin E, Fatty Acids, Food Chemistry, Chromatography.

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21841 | Potential use of native vineyard bacteria to control black-rot

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Background & Aim: Portugal is known worldwide for its exceptional winemaking, which plays a vital role in the nation's economy. However, the viticulture of the Douro region is being threatened by several pathogens, particularly *Phyllosticta ampellicida*, the causal agent of black rot disease. This disease causes outbreaks and can affect wine production. To date, Cu-based antimicrobials are the main treatment for black rot, but there is a growing demand for sustainable, eco-friendly alternatives due to increased consumer awareness and restrictions on pesticide use in agriculture. Using native grapevine bacteria as biological control agents (BCA) has shown promise in managing other diseases. This approach aligns with the concept of plant's performance being grounded on the phytobiome rather than on the genotype. **Results:** Thus, our work focused on isolating and screening a collection of native grapevine bacteria for their potential antagonistic effects against *P. ampellicida*. Five asymptomatic and five symptomatic grapevines were selected from three vineyards in the Douro region. Twenty leaves were taken from each plant for isolation of the native endophytic and epiphytic bacteria communities. After the isolation of the bacterial cultures, the collection was screened for their antagonistic properties against *P. ampellicida*. Thus, *P. ampellicida* was grown in TGYE until a 1.5 cm radius of mycelia was achieved. Then, each bacterial isolate was inoculated into filter paper disks. After an 8-day incubation at 25 °C, the radial growth of the fungus was measured, and the radial growth inhibition percentage was calculated. **Results:** Preliminary results show that certain isolates in our collection demonstrate significant antagonistic activity against *P. ampellicida*, exhibiting mycelia growth inhibition levels comparable to those of cycloheximide. **Conclusions:** Future research will further characterize this antagonistic behavior, focusing on assessing volatile organic compounds, anti-fungal compound production, quorum sensing, and lytic enzyme production.

Keywords: Black-Rot, Antagonistic Activity, Native Bacteria, Grapevines, Biological Control Agents.

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21929 | Modulation of phenylpropanoid pathway in *Xanthomonas euvesicatoria* infected tomato plants by *Satureja montana* essential oils and montmorillonite nanoclay

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Background & Aim: Bacterial Spot (BS), a disease caused by *Xanthomonas euvesicatoria* (Xeu), poses a significant threat to tomato crops worldwide. In Portugal, BS outbreaks endanger not only the nation's economy but also the farmer's income. Traditional control methods often rely on Cu-based chemicals, raising environmental concerns. However, stricter E.U. regulations, driven by environmental awareness, are limiting the use of Cu-based agrochemicals. This urges the necessity to develop more eco-friendly alternatives for controlling BS. Essential oils (EOs) derived from *Satureja montana* have exhibited promising antimicrobial activity against Xeu [1]. Incorporating *S. montana* EOs in montmorillonite nanoclay (NMT) offers additional benefits due to NMT's inherent antibacterial properties and its ability to act as a carrier and a stabilizer [2]. However, their impacts on the phenylpropanoid pathway, crucial for the plant's defense mechanisms against phytopathogens [3], remains unknown. This work investigated the potential of *S. montana* EO and NMT to modulate the phenylpropanoid pathway in *Solanum lycopersicum* var. *cerasiforme*. **Methods:** Tomato plants, both healthy and infected with Xeu, were treated with *S. montana* EO alone or combined with NMT (EO+NMT). The transcript levels of genes associated with the phenylpropanoid pathway (*c4h*, *hct*, *f5h*, *f3h* and *anr*) were assessed by RT-qPCR. **Results:** Treatments with *S. montana* EO and EO+NMT significantly downregulated the targeted genes in healthy plants. Notably, Xeu infection also downregulated these pathways. These results indicate that under Xeu attack, tomato plants hinder the production of flavonols, benefiting other compounds related to the lignin pathway as previously reported [4]. **Conclusions:** This work highlights that foliar applications of *S. montana* EO and/or NMT can alter the transcript levels of genes in the phenylpropanoid pathway. These findings contribute to the growing recognition of EOs as promising biopesticides and plant defense inducers.

Keywords: *Satureja Montana*, Montmorillonite, *Solanum Lycopersicum*, Bacterial Spot, Phenylpropanoid Pathway.

Acknowledgments

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21954 | Can foliar-applied silicon increase *Castanea sativa* Miller resilience to climate change?

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Background & Aims: Currently, heatwaves and long periods of water scarcity are the most prevalent factors affecting plant growth. According to future climate projections, even species known to be more tolerant to abiotic fluctuations, such as the chestnut tree (*Castanea sativa* Miller), will not prevail given the increased frequency, intensity and duration of such conditions. Bearing this in mind, finding tools to mitigate heat and drought-induced damage is a matter of special interest. Within this perspective, chemical priming arises as a possible solution, as elicitor molecules can modulate plants' physiological performance and promote the early activation of defence mechanisms, ensuring a better stress tolerance in the future. Since silicon (Si) is highly recognized to reduce the negative effects of different stresses, the main goal of this work is to assess if the foliar application of Si can improve young chestnut plants' resilience to heat and drought co-exposure. **Methods:** For this, Si-treated (1 or 2 mM) and non-treated plants were exposed to the combined action of heat (42 °C; 4 h/day) and drought (25% field capacity). After 21-days of exposure, different biometric and physiological parameters will be evaluated. Besides, the plant redox status will be evaluated through the quantification of reactive oxygen species levels, oxidative stress markers and the response of the antioxidant (AOX) system. **Results:** Given previous reports, it is hypothesized that Si-treated plants will present a lower ROS accumulation, paired with an increased AOX response, thereby contributing for a better plant performance. **Conclusions:** Altogether, this work will be able to provide a valuable insight regarding chemical priming as a tool to promote chestnut resilience to the combined action of heat and drought.

Keywords: Chestnut Plants, Drought Stress, Heat Stress, Stress Priming.

21979 | Nutrition-Boosted Innovations: Developing food product categories tailored to specific population groups and promoters of well-being

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Background & Aim: The demand for wellness-focused food products has been steadily increasing as consumers become more conscientious about their health. The desire for healthier options with nutritional improvements without sacrificing their original sensorial characteristics is the focus of many food industries that create “premium food” [1,2]. This project aims to develop food products of two commercially available matrices: 1) dark chocolate and 2) breakfast cereals (Figure 1), tailored to specific population groups. **Methods:** The optimized formulations were/ are being analyzed by 1) HPLC-DAD-MS to quantify fat- and water-soluble vitamins and polyphenolic profiles; 2) Colorimetric methods for sugars quantification; 3) ICP-MS for minerals quantification and 4) *in vitro* simulation of gastrointestinal digestion by the INFOGEST 2.0 method. **Results:** The original cereal recipe (>20g/100g of sugar) was optimized on sugar and fibre content by changing the variety of sugars added and crop flours used. The reformulated products had a maximum sugar content of < 11 g/100g. Moreover, new alternative recipes in the category of gluten-free and high protein content were also formulated using under-explored endogenous cultures. The reformulation of the chocolate matrix into a premium product is being performed through the introduction of functional micronutrients. The first lab prototypes are now ready for analysis. The characterization of both products in terms of bioaccessibility and bioavailability is in the optimization phase, aiming to predict the physiological amounts and structure of (micro)nutrients and phytochemicals. **Conclusions:** This work highlights the potential of ingredient reformulation or additions to introduce new choices that cater to specific population needs while ensuring a positive sensory experience for consumers. This research meets modern consumer demands for healthier options, showcasing the food industry's capacity for innovation and the continued production of high-quality products.

Keywords: Wellness Improvement, Premium Food, Breakfast Cereals, Dark Chocolate.

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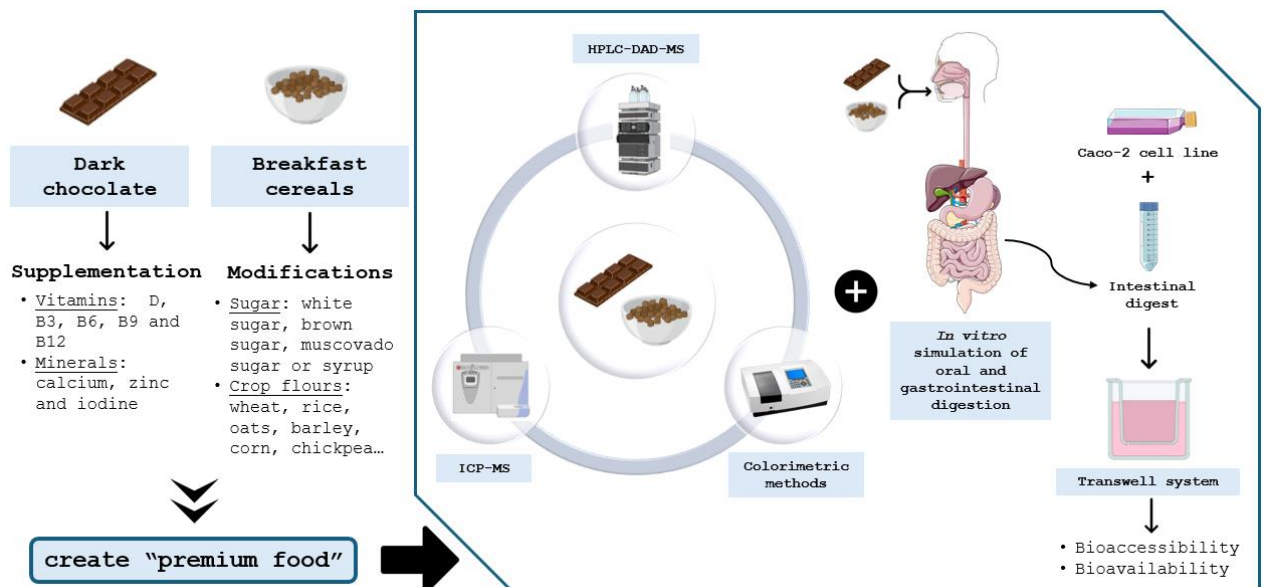


Figure 1: Graphical abstract of the work.

21981 | Effect evaluation of different nanoinsecticides on *Drosophila melanogaster*

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Background & Aim: Agriculture and the food industry are facing great pressure due to the rapid population growth, which lead to the urgent need for increasing food production. As a result, pesticides are increasingly used to control pests in agricultural crops to enhance food production yields. However, the excessive application of pesticides can cause environmental problems such as water, soil, and food contamination, as well as a decrease in biodiversity. To overcome these limitations, nanotechnology has attracted considerable attention in the agricultural sector through the design of nanopesticides, which consists of the use of nanomaterials (NM) as carriers of pesticide active ingredients (AI) to increase their stability and application efficiency, ultimately reducing the doses and the side effects on the environment. **Methods:** In this context, the present work allows to evaluate the efficacy of two types of nanoinsecticides: lipid NM containing lambda-cyhalothrin (mean particle size of 165.4 ± 2.34 nm and surface charge of -38.7 ± 0.954 mV nm) and chitosan NM containing the essential oil *Satureja montana* (mean particle size of 211.30 ± 6.20 nm and surface charge of 28.7 ± 1 mV) on *Drosophila melanogaster* used as target species. The mortality of them is checked after 12, 24 and 72 hours of exposure to different NM. **Results:** The efficacy of nanoinsecticides, in doses already known to be safe to non-target species, is compared with that of the active ingredients individually. **Conclusion:** The results obtained from this work allow to conclude whether the nanoencapsulation is able to enhance the biocidal activity of the active ingredients incorporated in the NM.

Keywords: Nanomaterials, Insecticides, Efficacy, Mortality, Flies.

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22119 | Biostimulant activity of microalgae and cyanobacteria for agricultural purposes

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Background & Aim: Nowadays, the farming industry is expected to fulfill the increasing global food demand efficiently and sustainably. Microalgae and cyanobacteria-based biostimulants come in handy to tackle the pollutant and health-hazardous synthetic fertilizers, having the potential to increase seed germination, plant growth and even the tolerance against some abiotic stresses. This project aims to develop an efficient biostimulant formulation of microalgae extracts. **Methods:** To choose the most suitable microalgae and cyanobacteria strains from the Fykia Biotech collection for biostimulant applications, we proceeded with germination and growth assay of tomato (*Solanum lycopersicum* L.) and lettuce (*Lactuca sativa* L.) seeds in Petri dishes. For that purpose, an aqueous extract was obtained by sonication of the biomass. The best candidates were then tested on soil conditions by drenching. Different concentrations of extract were tested as well as the time and number of applications to develop an optimized final product. Tomato and lettuce seeds were planted in pots of 5x5 cm with soil substrate where they grew in optimal conditions (25°C 16h/ 22°C 8h) inside an incubator for one month and a half. At the end of the assay, the plant size and fresh weight, and leaf area were measured. **Results:** Comparing with negative controls (distilled water), initial results indicate that almost all microalgal aqueous extracts from the collection have a biostimulant effect, which is similar to or even greater than the one of positive controls (commercial biofertilizer) for some strains. **Conclusions:** Aqueous extracts of microalgae and cyanobacteria strains from the collection demonstrated efficacy as biostimulants for lettuces and tomatoes, increasing the root size of the seedlings and improving plant growth plants. Thus, further optimizations can allow the use of these biostimulants for sustainable and harmless farming practices.

Keywords: Cyanobacteria, Microalgae, Biostimulant, Plant Growth, Agriculture.

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ARCHITECTURE

LUP 17.^a EDIÇÃO

21445 | Memory, territory, identity. Journey through the cooperative wineries of the Junta Nacional do Vinho

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Background & Aim: The Junta Nacional do Vinho (JNV) was an economic coordination body that guided Portugal's wine industry from 1937 to 1986, under the Estado Novo regime. It established a network of facilities, including wineries, labs, warehouses, and cellars, strategically located across key wine-producing regions. This infrastructure, with sixty-seven cooperative wineries, reflects technological advancements and architectural strategies of the time. Preserving their memory is vital for insights into the era's economic, cultural, and political landscape. The study aims to analyse these buildings' significance and their contribution to Portugal's viticulture heritage. **Methods:** The research involved two main aspects. Firstly, examining the political, social, and architectural context of these structures. Secondly, investigating the history and operations of JNV's cooperative wineries. Primary sources like drawings, documents, and JNV technicians' works were analysed, alongside secondary sources including academic literature. Various analytical methods were used, emphasizing drawing use as research tools and on-site visits for deeper insights. **Results:** Though JNV's achievements didn't fully meet objectives, its interventions left a lasting legacy. Many established wineries still play crucial roles in wine production, quality improvement, and regional economic sustainability. These buildings serve as tangible reminders, reflecting intertwined narratives of the regime and local communities. They represent a collective memory shaped by state initiatives and local community dedication. **Conclusions:** Studying these wineries offers a nuanced understanding of Portugal's viticultural landscape. Architectural diversity and strategic placements mirror socio-economic diversity. By contextualizing them historically, we contribute to discourse on preserving 20th-century industrial heritage, paving the way for further research and ensuring recognition of their enduring significance.

Keywords: Memory, Territory, Wineries, Junta Nacional Do Vinho, Estado Novo.

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Figure 1: Author's study notebook.

21601 | Retrospective Studies on the History of Portuguese Urban Planning, Part 2

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Background & Aim: This research is focused on the field of architectural theory and aims for a retrospective study of Portuguese urban theory. The goal is to understand the mutual influence, considering the reality of academic studies and teaching, and that of actual built architectural design in Portugal over the last century. **Methods:** This research will resort to a comprehensive and multidisciplinary bibliography, namely from a selection of magazines from the time period in question. It aims to document a series of landmark projects and Urban Plans (PUs) that helped shape the country, and the evolution of urban models in Portugal throughout the 20th century and the beginning of the 21st. This time window will be divided into 4 logical stages: *Modernism*, *Organic*, *Revolutionary*; and *Globalism*, in order to constitute a strategy of analysis that will allow us to tackle and study this time period in a clear and structured fashion. There will be a focus on the theme of urban planning as a field of study in Portugal, particularly in Oporto. This research will showcase a retrospective analysis of the evolution of the Syllabus at the Oporto School of Architecture. Simultaneously, a complementary cartography will be made, exhibiting some of the most seminal academic works by some of the most notable names that make up the student body of the Architecture course during the same period. We will dwell into their academic works and productions in order to attain a good understanding of the Oporto's School of Thought take on urbanism and its teachings. **Results:** It will be highlighted the parallelism between these two rhizomes. The aim is to provide an informed understanding of the thought and debate of Portuguese cultural production, both in the academic sphere, and the actual built architecture on the field. **Conclusions:** In general terms, it is expected to share an informed analysis on how the Portuguese urban design reality can constitute a catalyst for both rhizomes: the built urban design and architecture, and urbanism as a field of study in the academic sphere.

Keywords: Architecture, Urbanism, Postmodernism.

21837 | Beyond Borders: For a Sustainable Territorial Planning in Rio de Onor and Rihonor de Castilla

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Background & Aim: We propose a critical analysis on the dynamics of cross-border territories and collaborative practices transforming and revitalizing urban spaces, in the Northwest of the Iberian Peninsula. Our case-study is Rio de Onor - Portugal and Rihonor de Castilla - Spain, integrating with other cross-border cases. The aim is to define essential contributions within the community and its settlement, focusing on the relationship between territory and the border.

Methods: The research methodology involves analysis of urban structures and community dynamics on-site, through drawings, maps and photographs, complemented with bibliography and archives. The drawings highlight the opportunities and challenges associated with cross-border dynamics, moving beyond administrative borders, to consider cultural, social and geographic elements as units of integration in a common space.

Results: The research on the world's oldest political border - between Portugal and Spain - unveils the impact of an administrative or natural division on territory, communities and its settlements. Historic territorial agreements shaped a heterogeneous border territory, influenced by visible and invisible limits. Cross-border cooperation practices demonstrate successful strategies for overcoming conflicts, distance, isolation and managing natural resources, understanding border dynamics as an opportunity for a sustainable territorial planning in border regions.

Conclusions: The study concludes that collaborative urban planning in border territories recognizes historical divisions without obscuring their existence but rather frames them, to become spaces of encounter(s). In conclusion, insights from cross-border cooperation in Rio de Onor and Rihonor de Castilla not only enhance our understanding of border dynamics but also carries ancestral practical lessons for contemporary sustainable territorial planning, laying the groundwork for future analysis and fostering integrated border regions through cross-border cooperation.

Keywords: Border, Cross-border, Threshold, Territory, Rio de Onor.

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21850 | From Pedagogy to Space: Rethinking School Architecture for the 21st Century

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Background & Aim: Traditional teaching characterized by the teacher-centred transmission model, reflected in the persistent organization of school architecture, comes to be questioned by contemporary pedagogical development. New proposals for teaching suggest a paradigm shift, supporting active learning models centred on the student, capable of responding to a prospective idea of the future. Underlining the need for an interdisciplinary approach between architecture and pedagogy, this paper proposes to question the school architectural program considering the challenges of the 21st century. **Methods:** The study will look at evidence on the impact of space on the teaching-learning process, contemporary reflections in the field of pedagogy and the current models of school architecture. In this context, we will analyse the creation and consequences of Innovative Educational Environments (IEE), spaces designed to accommodate contemporary pedagogies, in three schools rehabilitated by PMEES [1]. **Results:** In all case studies, the IEEs presented identical spaces but with different uses and impacts. The analysis of these examples confirms that architecture, despite its ability to provide conditions for contemporary pedagogies to be applied, may not be enough to influence the methodologies applied and, above all, on learning outcomes. **Conclusions:** This research concludes that architecture is an essential element in transforming pedagogical dynamics. It also shows that architecture can provide spaces that offer students a favourable environment for learning, as well as taking on a pedagogical role, encouraging interaction, sparking curiosity, and fostering the skills needed for the school of tomorrow. However, it is understood that the responsibility for building a better education must derive from the ability of contemporary pedagogy to present architecture with its needs so that organizational solutions and spatial qualification can contribute more actively to enriching the teaching-learning process.

Keywords: School Architecture, Pedagogy, *Innovative Educational Environments*, Learning Spaces.

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21870 | Reimagining the Present to Design Tomorrow: adaptability and flexibility in Architecture

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Background & Aim: In the realm of modern architecture, there is a growing desire for timeless designs that can adapt to contemporary needs and endure over time. While architecture often focuses on immediate function, there is a call for a more forward-thinking approach that takes future demands into account. Concepts such as adaptability and flexibility emerge as key to achieve architectural longevity. Drawing on theories, this study aims to explore how these concepts can inform architectural design, proposing alternatives to demolition and obsolescence, while re-evaluating current practices. **Methods:** The study is based on the exploration of concepts such as adaptability and flexibility in architecture, drawing upon the theories of Steward Brand's "Shearing Layers" (1) and John Habraken's "Open Building" (2). It utilizes a preliminary approach to define key terms and establish a framework for understanding the connection between flexibility, adaptability, and longevity in architectural design. The layer division is employed to bring a deeper analysis of design and its implications for longevity. **Results:** The study highlights the importance of adaptability and flexibility in architectural design, emphasizing the need for buildings to be able to withstand significant changes in conditions and functions over time. By incorporating layers on this concept into the design process, architects are able to create structures that are better prepared to respond to evolving needs and challenges, avoiding obsolescence. The division between layers allows for a better understanding of how different aspects of design contribute to longevity, with an emphasis on preserving multiple layers to improve adaptation. **Conclusions:** In conclusion, the study underlines the value of adaptability and flexibility as key factors in ensuring the longevity on architecture. By re-evaluating current architectural practices and finding new, more thoughtful ones, architects can pave the way for a better response to structures that will then find new life without falling into obsolescence.

Keywords: Adapt, Flexible, Function, Layers, Longevity.

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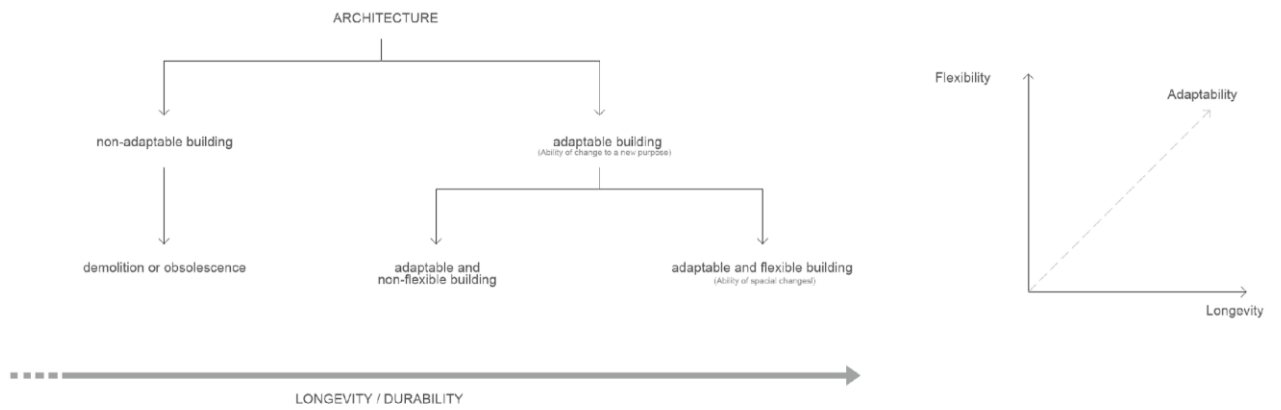


Figure 1: How adaptability and flexibility affect architecture longevity.

21874 | Contribution to A New Machine for Living for the 21st Century Affordable Rent Housing Project for The Monte Da Bela Neighbourhood, Porto

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Background & Aims: This work aims to contribute to the idealization of a “new machine for living” that provides affordable housing, responds to the needs of the multiplicity of 21st century families, houses new forms of remote work, contributes to social cohesion and integration in an increasingly multicultural society, reduces energy poverty, and mitigates environmental problems. **Methods:** The research first identifies good practices that foster economic, social, and ecological sustainability at multiple levels: housing, neighbourhood, city, and planet; described and illustrated with examples of built architecture. These practices are applied in a proposal for an affordable rent neighbourhood in Monte da Bela, located in Campanhã-Porto, based on the premises of a public tender launched for the area, but not implemented. **Results:** The good practices were grouped into 3 groups: space flexibilization; social condensers; and passive solar architecture. Some recover ideas introduced by the Modern Movement Architecture, like the open floor plan, the flat roof, and communal areas. Others draw inspiration from traditional architecture to bring energy and ecological efficiency to the building through passive solar solutions such as orientation, ventilation, or the use of vegetation. The proposed dwellings design allows the interior reorganization whenever adaptations to new work circumstances or household size are required (spatial flexibility). Social condensation spaces were designed on the flat roofs (communal spaces) and on the mostly open floor plan (stores, green spaces, shaded living spaces). Environmental performance was enhanced by the creation of green spaces, façade shading with deciduous trees, green roofs, lighting control devices, cross ventilation, and thermal insulation. **Conclusions:** The result is a proposal integrated in the surroundings and adjusted to a rugged topography, enhancing the proximity city, social justice and equity, and environmental balance.

Keywords: Space Flexibilization, Social Condensers, Passive Solar Architecture, Sustainability.

Acknowledgments

The author acknowledges his supervisors, Ana Silva Fernandes and Gisela Lameira, for the supervision; and the architect José Gigante for providing vital information on the Monte da Bela allotment.

22063 | Spatiality and Meaningful Experiences in The Work of Fernando Távora and Álvaro Siza

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Background & Aim: The purpose of this investigation is the relationship between the practice and spatial enjoyment of architectural design, focusing on the work of Fernando Távora and Álvaro Siza, in the period between modernity and contemporary times. Preparing an analysis of the entire work, and the identification of moments of significant spatial experience, addressing the influence of architectural space, on significant sensory experiences. As an objective, we intend to investigate vectors present in the organization of spaces by the project, examining recurrences in the creative acts of architects, as well as how spatial definitions are perceived by visitors. **Methods:** The research methodology comprises bibliographical collections, analysis of project pieces, photographic surveys and visits to works, and above all comparative analytical design of works by the two architects and contributes and stimulates reflection on the way in which contemporary Portuguese architecture and projects can combine harmonies between space and experience. **Results:** In a future phase of the research, it is planned to analyse four case studies of religious architecture: the Church of Marco de Canaveses and the Parish Church of São João de Bosco in Évora, Álvaro Siza, and the Convent of the Franciscan Sisters of Calais in Gondomar and Convento de Santa Marinha and Pousada de Fernando Távora, comprising characteristics of the spatial design and specifically by these two Portuguese protagonists in their formal architectural design. **Conclusions:** For now, we focus on concepts around disciplinary autonomy, style, architect sensitivity and experience, and examine key cases of Portuguese architecture, reflecting on the underlying intentions and their successes in terms of provoking intense sensorial and contemplative experiences. and significant.

22134 | Multiculturalism, from ethnic diversity to ecumenical public Space

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Background & Aim: Martim Moniz Square in Lisbon is an exemplary case of interculturality and social integration. Currently, the square is an attractive and culturally rich point due to its multicultural commercial offerings. In 2023, the city council launched a public competition for the redevelopment of the square, addressing the needs felt by the space users and eliminating situations harmful to safety and accessibility. Based on the needs of these communities, it is crucial to understand the sense of living in outdoor spaces in their countries of origin and abroad. The aim is to approach a thinking and design that is inclusive, ecumenical, and feasible.

Methods: Observing and listening to cultural diversity and ethnic qualities contributes to the sustainable and progressive development of the city. In this way, this research follows a methodology of experimental practice with the objective of collecting distinct potential solutions for discussion. As architecture and urbanism applied to people and their own appropriations are studied, modes of dwelling and co-living are examined. I propose to develop the theme of the competition through an analysis of the competing proposals characterizing the space and highlighting the extent to which the theme of interculturality and its integrative relationship with the city are observed. On the other hand, to follow this process, interviews and field visits will be conducted for better data collection. **Results:** The results obtained from this research will involve a programmatic, morphological, and typological comparison with the aim of confronting the various responses to the theme and subsequently approaching a more conclusive thought. **Conclusions:** The theme of multiculturalism awakens a special social dimension that drives urban development and transformation. Thus, it is intended to conclude how public space intrinsically relates to the various modes of distinct cultural occupation, aware that it is a living and public space, that is, a flexible multiplicity of appropriations.

Keywords: Multiculturalism, Integration, Public Space, Vulnerabilities, Ecumenical.

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21390 | Analysis of Richard Oswald's *Die Reise um die Erde in 80 Tagen*, an Adaptation of Jules Verne's *Around the World in 80 Days*

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Richard Oswald's filmography spans almost five decades and several genres, from epic historical dramas like *Lucrezia Borgia* (1922), to absurd comedies like *Kurfürstendamm* (1920) and adventure films like *Tempête sur l'Asie* (1938), not to mention his Aufklärungsfilm, like *Anders als die Andern* (1919). Oswald's *Die Reise um die Erde in 80 Tagen* was one of the many films produced during the 1910s that were considered missing, until it was rediscovered and subsequently showcased in 2021, at the Deutsches Historisches Museum. Due to how recent its rediscovery is, studies on *Die Reise um die Erde in 80 Tagen* are scarce; not to mention Richard Oswald's obscurity in film history. Our proposal is to study and present the film on how it adapted Jules Verne's *Around the World in 80 Days* to the screen, on a poster. To achieve this, besides reading the book and watching the film, we shall consult Wolfgang Jacobsen, Anton Kaes and Hans Helmut Prinzler's book *Geschichte des Deutschen Films* and Brian McFarlane's *Novel to Film*, alongside other, more specific books about Richard Oswald and his filmography, like Helga Belach and Wolfgang Jacobsen's *Richard Oswald: Regisseur Und Produzent*. The film is more comedic in nature than the original book.

Keywords: German Cinema, Richard Oswald, Jules Verne, Film Adaptations.

Acknowledgments

Beatrix Haußmann, of the Bundesarchiv, for providing us with the film.

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21532 | Chromatic Aberration: Development of a chromatic typography for social awareness

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This project aims to create a chromatic typography set with the theme of climate change as its focus. At first, the set is expected to be created digitally in OpenType-SVG, and then produce chromatic type matrices for design students to use in a workshop. This workshop aims to test the effectiveness of the typographic matrices by producing a series of climate demonstration posters. To validate and acquire knowledge on the subject, a literature review and study on the state of the art were conducted, consulting interviews, manuals, and articles such as “The Evolution of Chromatic Type, Jamie Clarke, 2017” [1] and “Building Bixa Color, a color font for the web, Pixel Ambacht, 2016” [2]. This is speculated to be followed by a discussion and evaluation of the results obtained from the workshop. The result is aimed to be a complete set of capital letters, from A to Z, and each letter to have three separate layers (the letter plus two accessory layers). In addition, this project aims to demonstrate the ability of typography not only to be a writing and teaching tool but also to have a narrative. In short, this project highlights the continuing relevance of typography in the contemporary world, by exploring the intersection between digital and analog means. In addition, it highlights the importance of taking a stance and developing innovative approaches to address significant themes by providing renewed attention and generating the necessary interest in the population.

Keywords: Chromatic Typography, Overprint, Social Awareness, Type Design.

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21540 | Reinventing analog printing: Exploring traditional printing techniques in an accessible academic context

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Background & Aim: In an era centered on digital media, analog printing techniques, specifically letterpress, are considered obsolete processes (Meira & Dias, 2022). Despite the limited accessibility of these traditional tools and methods, material interest is resurgent in these analog processes. These processes significantly increase the expressive and visual possibilities of graphic, editorial, and communication design since by restricting ourselves to digital media, we face a restriction in our creativity. In addition to a pre-existing interest in analog techniques and learning about graphic and editorial design through the history and methods from which this area emerged, analog printing techniques also allow one to explore material, presence, and intervention as an author throughout the printing process. From an extrinsic point of view, this project is also an essential contribution to the research and application field of graphic design, not only by reviving these techniques and increasing the range of possibilities and media — combating the growing digital normalization of — creative possibilities in design, but also by making them accessible to anyone. Therefore, the main objective of this project is to develop options that provide easy access to the tools and the obsolete analog processes needed to explore these processes with current materials. **Methods:** An in-depth analysis was carried out on the relevance of returning to supposedly outdated methods (e.g., Gonçalves & Quelhas, 2021) and why they are so difficult to access. Having said this, following the analysis of academic research, such as the XTIM project within I2ADS (i2ADS, 2022), and taking into account other academic projects that study the same purpose, a model of a *provisional press* was studied based on Steve Garst's model (Garst, 2020). This *provisional press*, in addition to demonstrating similar efficiency to a regular flatbed proof press but at a lower cost, also seeks to adapt to different matrices with different heights, from movable type to linoleum or even the thickness of a photopolymer plate. This instrument aims to be an object that can be built by the author himself, affordable and easy to assemble and transport. **Results:** It's expected that this project will spread the word about alternative technologies to digital, along with greater accessibility of instruments. From a more artistic point of view, or in conjunction with graphic and editorial design, comes up a set of prints that prove that this *provisional press* model ensures print quality with results that are just as valid as a mechanically built flatbed proof press.

Keywords: Provisional Press, Letterpress, Analog Printing.

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21639 | Artificial Intelligence as a creative tool for type designers

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Until the '70s, typefaces were created manually by specialized designers, which was a process that took considerable time, judgment, and skill [1]. However, the rise of digital technology has transformed this scenario, with the development of Computer-Aided Design (CAD) and vector drawing software, creating fonts has become more accessible and efficient. Instead of having several workers, we have one type designer in front of a computer doing everything independently [2]. These days, we are witnessing a new frontier in the evolution of Type Design, incorporating a new tool into the creative process: Artificial Intelligence (AI). This study aims to analyze the type design industry in the Western world and its relation with the application of Artificial Intelligence in the type designers' creative process, so it can be presented as a possible tool for type designers since it is seen as a threat or an unethical way to professional activity. A research and document analysis will unveil the historical context of digital Type Design and its evolution. The conventional Type Design process is explained and analyzed, giving context to the term creativity, followed by a framework for AI in Design, specifically in Type Design. Next, relevant individuals will be interviewed, and their opinions and experiences will be analysed. AI applied in typography creation is an emerging field that needs more development, despite increasing in recent years. Through some works that have already used this technology, such as *Automated Type Design* by Daniel Wenzel [3], *Aesthetics Imperfections* by Gianpaolo Tucci [4], or *Pathfinder* by Jean Bohm [5], it's possible to confirm that AI is a potential tool to increase productivity, efficiency, and creativity. It's expected that this thesis inspires type designers to explore and embrace AI, encouraging experimentation and leading to new levels of knowledge and expertise in Type Design, breaking biases, and promoting AI as a helpful tool in the creative process of Type Design.

Keywords: AI, Creative Process, Computational Design, Digital Typefaces.

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21681 | Modular Typography: Development of a Typographic Game

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Background & Aim: The expressive potential of typography lies in the typographic versatility of styles and variations and in the adaptability with which a typeface can be easily applied to different contexts, or areas. Typefaces are vehicles of expression and communication that evoke messages and visual cultural meanings combined with a long history of tradition. This research aims to design a typographic game to promote the creative process of typographic construction as a vehicle for expression and abstract composition and to stimulate a more meaningful learning experience through a playful and modular approach that focuses on aspects such as the development of curiosity, creativity and experimentation. **Methods:** The current study is organized into three phases. Firstly, data was collected on the history and morphology of typography, particularly the formal characteristics – anatomy [1] and principles of modularity [2] – predominant in the construction of type design, through a brief introduction to the literature review. Secondly, three prototype typographic games were built and evaluated in parallel, based on carrying out and conducting test sessions and iterations in an academic and social context, to understand the various objects of study individually and globally and, successively, to determine the object of study that best corresponds to the objectives of this research problem. Thirdly, the realization of a workshop to validate the project and the ultimate goal of this research. **Expected Results:** Competition, challenges and opposition are determining factors that influence the state of flow of a game [3][4] through concentration, fun and curiosity, and challenge players to put their skills and competences into practice, stimulating their reasoning and problem-solving abilities. Likewise, it is estimated that the application of typographic elements incorporated into a game structure promotes a playful approach that focuses the challenge on modular construction, acquisition and exploration of the history and typographic lexicon, allowing players to explore emerging or unanticipated aesthetics. **Potential Implications:** It is speculated that these results contribute to the evolution of new complementary approaches in typographic teaching. While also expanding the knowledge on modular typography and game-based learning. This method of learning allows the use of a utopian lexicon and a new language for users, resorting to a typeface design that suggests diverse applications in multiple types of contexts and different areas of communication such as branding, editorial, signage, among others.

Keywords: Typography, Game Design – Game-Based Learning, Playful Design.

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21689 | Food and Familiar Memory: An Open Self-Narrative Archive

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Background & Aim: Since the dawn of civilization, sharing a meal has always been more than a mere necessity - it is a social act that brings people together, whether they are family, friends, or strangers (Philippe Aries et al., 1987). Food goes beyond its function of sustenance; it is a social bond that allows for the creation of memories and the strengthening of relationships, while also preserving traditions (Philippe Aries et al., 1990). The influence of food on our family memory is evident, as it is within this same context that our first routines are born and developed. From my earliest memories, I remember spending countless hours with my family at the table. While adults conversed amidst food and stories, I often preferred playtime. However, as I matured, these moments dwindled, leading me to cherish them more. This newfound appreciation for life's simple rituals sparked a desire to explore our collective identity—understanding our origins, flavors, and preserving our shared voice. **Methods:** In this research work, interviews, field observation, consultation of photographic archives, and literature review were used to understand the relationship between food, memory, and family identity. Twelve people were interviewed, ranging from ages 10 to 85, spanning from the youngest to the oldest generations of my family. The primary aim of this methodology was to gather descriptions of memories centered around food. **Results:** Illustration emerges as a fundamental tool for reflecting on the importance of these simple yet significant moments that shape our culture and identity, as well as assisting in their preservation and perpetuation. My project is presented as an illustrated self-narrative book, aiming to preserve these memories and make them eternal by putting them on paper. Reinterpretations of the revealed realities will be illustrated, capturing the essence of foods and smells, individual and collective stories. **Conclusions:** Preserving and studying my family's traditions has always been my goal. This illustrated book offers a fresh perspective on daily life, immortalizing the love in every recipe step and the nostalgia in every taste. It aims to revive forgotten dishes and moments, inspiring awareness that mere presence can carry a tradition to the next generation.

Keywords: Food, Memory, Family, Illustration Book.

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21696 | Playing with Colour: Exercises to Explore Colors as a Unique Emotional Language in Graphic Design and as a Catalyst for Creativity

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Background & Aim: Talking about color is like describing the sky, talking about sensitivity. Color is and will always be a creator of worlds and environments; every day it fills shapes, places, people, emotions, and even the pages of books. Color is more than a visual phenomenon; it is a unique emotional language and a symbolic tool for all designers (Stone et al, 2008). This project proposes the creation of a manual of practical exploratory color exercises, intended to function not only as a practical guide to supplement color education but also as a tool to stimulate creative expression. The project aims to understand how the application of practical color exercises can enhance creativity and maximize its learning. **Methods:** Considering the outlined objectives, the methodology adopted is predominantly qualitative. The methods used consist of surveys (quantitative in nature), case studies, and participatory observation (both qualitative in nature). Taking this into account, the project is structured into three distinct phases: investigation and definition; planning and data collection; and project development. In the first phase, the problem was defined, and bibliographic research was conducted, including literature review and state of the art. In phase 2, the strategy was defined, and data synthesis was carried out, obtained through the survey, case studies, and bibliographic collection. Based on these data, the development of practical exploratory color exercises was carried out, this phase ends with the testing of these exercises in the creative workshop. In phase 3, after testing the exercises in the workshop, they were reviewed and adapted to a manual format. It is in this phase that the entire project development takes place, until it is finalized. **Results:** Each method (survey, case studies, and participatory observation) was chosen to align with the research objectives and gather necessary data. The survey aimed to understand design students' experiences with color teaching and identify areas for improvement. Case studies examined existing materials in design education to inform effective exercise formulation. Participatory observation during workshops evaluated exercise practicality, offering real-time feedback for manual refinement. This comprehensive approach ensures meaningful project development. **Conclusions:** The obtained results emphasize the relevance of the practical approach in color education, supporting Albers' premise regarding the primacy of experience over theory (Albers, J. 1973). The manual for practical exploratory color exercises is a significant contribution to

design, offering a hands-on approach to understanding color concepts. This project highlights the importance of experiential learning and emphasizes the continual need for adaptation and innovation in color education for graphic design.

Keywords: Colour, Graphic Design, Color Teaching, Creative Workshop.

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21875 | Contribution to a sustainable proposal for supermarket delivery services (e-commerce)

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Background & Aim: In recent years, there has been substantial growth in supermarket e-commerce services [1]. Regarding the food sector, several peculiarities and requirements lead to a significant increase in the consumption of single-use plastics, which is very harmful to the environment [2], [3], [4]. The main goal of this project is to contribute to sustainable solutions for supermarket e-commerce services, replacing single-use plastics by reusable equipment with high longevity. **Methods:** Mixed methods were used including analysis of packaging methods in Portuguese supermarkets and effective delivery solutions from supermarkets worldwide, as well as participant observation of the picking process in the main warehouse of Continente Online. Intrinsic problems were identified that compromise the service efficiency and sustainability. **Results:** A set of reusable components was designed to adapt to the containers currently used by Continente and other supermarkets. It is expected that these components contribute to a significant reduction in single-use packaging materials, such as plastic bags and protective, spill-resistant plastic packaging. In addition, the designed components improve product protection during transport, ensuring their physical integrity. **Conclusions:** This research has contributed to solutions to extinguish the excessive use of single-use materials to preserve products during transportation, observed in many supermarket e-commerce services. The components designed are adaptable to existing transport equipment and are reusable. For the next phases, the equipment designed will be prototyped and submitted to a real operations test at the Continente supermarket in Aveiro.

Keywords: Product Design, Sonae, E-Commerce, Single-Use Plastics, Sustainability.

Acknowledgments

This project is funded by the master's degree in Product and Industrial Design, of the Faculty of Fine Arts and the Faculty of Engineering, University of Porto and Sonae MC.

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21886 | Figuras de Costumes - Portraits of Portugal

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Figuras de Costumes offer and reflect an image of the cultural and historical representation of some social strata in each era. Through those, artisans are able to display the singularities of each region. This folk art enables the transmission of narratives, values and traditions, helping to communicate the cultural identities of the respective communities. One of the pioneers and great promoters of this art in Portugal was the sculptor José Joaquim Teixeira Lopes (1837-1918), whose vast work includes a large number of figures, from the last quarter of the 19th century. The Natural History and Science Museum of the University of Porto has a collection of Figuras de Costumes comprising forty-nine pieces, which had yet to be studied. The collection is varied and rich, both in terms of the figures represented and their production. Some may have been created by Teixeira Lopes. This project aimed to re-qualify these figures, studying them individually and in relation to the different groups identified. Analysing documents and conducting interviews with potential connoisseurs of this type of art were fundamental to gather data and to identify the artisans or factories that produced these pieces, since many others besides Teixeira Lopes produced them, some of them disciples of the sculptor. A survey of the motifs represented was also essential, in order to relate the different sets in this collection to the elite's interest in ceramic figures. It is essential to frame the collection with the adaptations made to these productions. The creation of a distinct narrative with the history and meaning of these objects, which will be the ultimate result of this project, will make it possible to identify the producers, the collectors, and the significance of these objects in the society of Porto in the transition from the 19th to the 20th century. The study of this collection will draw attention to the artistic value of Costume Figures and their symbolism and meaning in Portuguese society.

Keywords: Figuras De Costumes, Ceramics, Collections, Popular Culture, Tradition.

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Figure 1: Figura de Costumes – Coleção do Museu de História Natural e da Ciência da Universidade do Porto. Fonte © Pedro Vergueiro - 15 de janeiro de 2024

21901 | The Ancient Door- Graphic Narrative adapted to the Manga style, Isekai genre.

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Background and aims: The Ancient Door is a research illustration project initiated within the Master's program in Graphic Design and Editorial Projects at the Faculty of Fine Arts, University of Porto. This endeavor is dedicated to delving into the intricate world of Japanese manga, specifically focusing on the Isekai subgenre. Isekai narratives have garnered significant attention for their unique premise of transporting characters from the real world into alternate universes, offering readers an immersive and captivating experience. Through the lens of manga, this project seeks to unravel the allure of Isekai storytelling, fostering a deeper understanding of its cultural significance within Japanese society. Understanding the development of manga as a Japanese cultural heritage. Explore the definition of Isekai genre. Development of a pilot chapter for an Isekai manga novel. **Methods:** Methodology encompasses a multifaceted approach, blending anthropological research, ethnographic studies, and content analysis. By engaging directly with the community of creators and enthusiasts within the Isekai genre, we aim to unearth the underlying themes and motifs that resonate with audiences [1]. **Results:** The result of this research will manifest in the development of a pilot chapter, crafted in the traditional Japanese style. Spanning 38-42 pages in B4 format, the chapter will be rendered in black and white using nibs and sumi ink. **Conclusions:** Through this project, we aspire to not only contribute to the academic discourse surrounding manga and Isekai narratives but also to provide insight into the evolving nature of storytelling in contemporary Japanese culture. By contextualizing our findings within the backdrop of historical Japan, we endeavor to shed light on the enduring appeal of Isekai narratives, particularly in the wake of global events such as the Covid-19 pandemic.

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古代 The Ancient Door の扉

Graphic narrative adapted to the Manga style, Isekai Genre

Abstract | Resume

The Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination. The Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination.

Introduction

The Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination. The Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination.

Goals

- Understanding the Isekai genre and its impact on the reader's imagination.
- Exploring the various sub-genres of the Isekai genre.
- Developing a graphic narrative that captures the essence of the Isekai genre.

Chapters

- The Isekai Genre: A New World of Adventure and Fantasy
- The Isekai Genre: A New World of Adventure and Fantasy
- The Isekai Genre: A New World of Adventure and Fantasy

Graphic narrative adapted to the Manga style, Isekai Genre



Results

The results of this implementation of a graphic narrative in the Isekai genre are presented in this graphic narrative. The Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination.

Methodologies

The methodology of this graphic narrative is based on the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination. The Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination.

Conclusion

The conclusion of this graphic narrative is that the Isekai genre is a sub-genre of science fiction, known for its ability to transport the reader to a new world, often in the form of a portal or a magical realm. This graphic narrative is a resume of the Isekai genre, exploring its various sub-genres and the impact it has on the reader's imagination.

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Figure 1: Poster design proposal

**21933 | Design under market logic: A critical analysis of graphic design and its
practice in a
neoliberal society**

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The study aims to carry out an in-depth analysis of the interaction between graphic design and the current neoliberal rationale, presenting a broad overview of the different social sectors in the context of Brazilian outskirts and their connections with design. Particular emphasis is placed on investigating the complexities related to access to quality higher education, historically marked by elitism. The work highlights the difficulties faced by certain social classes in their search for qualifications, placing such obstacles in the context of the market logic that permeates the precariousness of higher education. Furthermore, the study explores the implications of this scenario for the insertion of certain marginalized social groups into the formal job market, highlighting the existing barriers. The analysis extends to the precariousness of work models due to the flexibilization of their conditions, the alienation of work and the influence of the entrepreneurial mentality in the creative environment, highlighting the direct influence of neoliberalism on this phenomenon. Through a qualitative approach, the study aims to provide a deeper understanding of the intersections between graphic design, elitist higher education and contemporary socioeconomic dynamics, thus contributing to a more comprehensive reflection on the implications of neoliberalism on practices and opportunities in the field of design in the Brazilian context.

Keywords: Design, Neoliberalism, Precarious Work, Higher Education, Politics.

21967 | Empowering Asthma Patients through Digital Learning: Interface design of the PAAI online educational programme

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Background & Aim: The global prevalence of asthma highlights the urgent need to educate patients, carers and the community about effective disease management. The PAAI - Interactive Online Self-Learning Programme for Asthma Patients is a pioneering initiative to develop an online educational programme established in collaboration with the patient community and health professionals within the ConectAR framework, a collaborative patient and public involvement (PPI) network aimed at advancing respiratory disease and digital health research. PAAI, online course programme aims not only to increase knowledge about asthma, but also to improve adherence to treatment and encourage active participation in health decisions. In this project we describe the interface design process of the PAAI. **Methods:** This design project adopts a user-centered design (UCD) methodology, seamlessly integrating user experience (UX) and user interface (UI) principles to enhance the end-user experience. Compliance with the Web Content Accessibility Guidelines (WCAG) guides the entire design process, ensuring that content is easily perceived, usable, understandable and robust to meet a wide range of user needs. The development strategy is characterized by its iterative nature, allowing for continuous refinement based on direct user feedback, promoting a truly inclusive digital solution. As the designer, I am prioritising the user experience (UX), creating an intuitive interface that is easy to navigate, with colours and typography that are legible and pleasing to the eye. The site be optimised for different devices and include accessibility features. The visual design should be attractive and professional, using high-quality images and videos, a consistent and organised layout, relevant graphic elements and a unique visual identity. should be attractive and professional, using high-quality images and videos, a consistent and organised layout, relevant graphic elements and a unique visual identity. It is important to consider the target audience, adapting the site's design and content to their needs. Researching the competition and analysing the websites of other similar online courses is important to identify what can be done to differentiate my design. Testing and optimising the site with different users is essential to ensure that it is easy to use and navigate, making adjustments to the design and content based on user

feedback. **Results:** Although the project is still in development, expectations are high based on the demand for accessible online educational resources and initial feedback. The interface design, guided by WCAG and enriched by user participation, promises significant accessibility and an improved learning experience. The implementation of these strategies is expected to facilitate access to asthma content, making health education more inclusive and effective. To increase the chances of success, it is important to invest in a high-quality website with a professional design and relevant content, as well as promoting the course through various marketing strategies. User experience is also key, with a website that is easy to use and navigate. Tracking results through analysis tools is essential to identify areas that can be optimised. In my case, I'll have feedback from users throughout the process in order to have a final product that meets expectations. **Conclusions:** The development of an accessible and inclusive graphical interface for the online asthma course reflects a strong commitment to improving health education. This innovative project highlights the importance of inclusive and participatory design approaches and promises to transform the educational experience for asthma patients and their carers. In addition to meeting accessibility standards, the course aims to provide a rich and interactive learning experience that will empower patients to make informed decisions about their health, improve adherence to treatment and encourage open and constructive dialogue with healthcare professionals.

Keywords: User-centered design, Web accessibility, Digital health literacy

Syndicate

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Background & Aim: The “Seven Veils” project emerges from the intrinsic need to delve into and document the lives of the members of the TT Syndicate band, even in the face of their relative lack of influence in the mainstream music scene in Portugal. As a niche music band, TT Syndicate faces unique challenges on its journey, with a more restricted fan base and a less notable presence in conventional media. However, it is precisely this peripheral position that lends even more importance to its story and its contribution to the Portuguese music scene. In investigating the trajectory of TT Syndicate, the project not only explores its musical path but also seeks to understand the personal aspects and individual experiences of the musicians within the band. The closeness to TT Syndicate members provides exclusive access to a rich documentary archive, composed of photographs, memories, and interviews, which offer valuable insights into the lives and art of these musicians. **Methods:** The methodology adopts a blended approach, combining qualitative and quantitative methodologies. Initially, content curation is conducted based on predetermined criteria, emphasizing the relevance, authenticity, and representativeness of information pertaining to the TT Syndicate band. Subsequently, reader feedback is solicited to assess the efficacy of selected content, narrative coherence, and emotional resonance. Concurrently, the journal’s distribution performance across pertinent locales, is meticulously tracked. **Results:** It is expected that the “Seven Veils” journal will offer a unique and meaningful experience for readers while documenting the history of the TT Syndicate band and highlighting its importance in the Portuguese musical context. **Conclusions:** The main expected conclusions of the work include the creation of an authentic and engaging documentary journal that narrates the journey of TT Syndicate.

Keywords: Jornal, Música, TT Syndicate, Íntimo, Documental.



ASTRONOMY & MATHS



Feedback

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Background & Aim: The present study, currently in progress, is being done as part of an internship within the curricular unit of Initiation to Professional Practice in the curriculum of Master Degree in Mathematics Teaching of the Faculty of Sciences of the University of Porto. It focuses on the investigation of an 11th grade class in a Porto region school during the 2023/2024 academic year, covering various math topics. The main objective of this study is to explore the impact of the teacher's feedback and messages that promote a mathematical mindset on the academic achievement of 11th grade students. Mathematical mindset, pioneered by Jo Boaler of Stanford University, focuses on an innovative approach to teaching and learning. The study aims to answer: (i) How do students relate to the subject and mathematical learning? (ii) How do students appropriate mathematical messages and feedback offered by the teacher? **Methods:** An observation-based research study has been adopted. This approach provides the collection of data that formed the basis of the qualitative analysis that will allow answers to the questions asked. These data will be obtained through documentary collection of students' written productions, direct observation of their work in the classroom, questionnaires and audio recording of oral feedback and interviews. **Results:** Preliminary results indicate that: (i) There is a relationship between students' mathematical mindset and their ability to enhance their resolutions after receiving feedback from the teacher. (ii) Most students who made improvements after teacher feedback did so to perform well on the test or to learn from their mistakes. Also, these students followed the feedback guidelines. (iii) All students felt that the feedback received was relevant to understanding their mistakes. **Conclusion:** The mathematical mindset of students influences how they assimilate teacher feedback and the reasons behind their improvements in task resolutions.

Keywords: Math Mindset, Feedback, Task resolutions.

21479 | Formative assessment through peer feedback: Contribution to the development of students' written mathematical communication

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Background & Aim: This poster presents research being carried out in the context of Supervised Teaching Practice as part of the Master's Degree in Maths Teaching in the 3rd cycle of Primary and Secondary Education at the Faculty of Sciences of the University of Porto, the aim of which is to understand how the practice of a formative assessment process through peer feedback can contribute to the development of students' written mathematical communication. **Methods:** Through qualitative and interpretative research, the data collection process involves analysing the tasks carried out by students in a 7th-grade class and their peer feedback, complemented by the application of questionnaire surveys and interviews. **Results:** Peer feedback activities enable students to overcome their difficulties in written mathematical communication. It stands out that the fact that students know the aim of the task means that they pay more attention to mathematical argumentation. However, after the completion of four tasks, it can be seen that continuous work is still needed to make more significant improvements, both in terms of solving the task and the feedback itself. The students integrate the feedback they receive to improve their productions, showing an evolution in the feedback provided activity after activity, as a result of practice and the different approaches to feedback on the part of the teacher.

Keywords: Pedagogical Assessment, Problem Solving, Peer Feedback.

21535 | The strategies used by students when carrying out mathematical tasks involving the exploration of patterns

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Background & Aim: This research, which is still under development, is the result of supervised teaching practice for the Master in Mathematics Teacher Education for Middle and Secondary Schools, during the 2023/2024 school year. The study aims to investigate the different strategies used by students in mathematical tasks involving the exploration of patterns. **Methods:** The research is based on a qualitative and interpretative methodology. Data collection occurred during three lessons focusing on the topic "Sequences", within the context of a class of 15 students, in the 7th grade, at a school in the Porto region. The students were organized into four groups and, in each of the three lessons, they carried out a task involving the generalization of patterns. To collect the data, we used direct observation in the classroom, the written productions from each group and audio recordings of the discussions of each group during the resolution process and the collective class discussions during result presentations. **Results:** This study made it possible to identify different types of strategies used by students, highlighting the more textual and schematic strategies. Consequently, it was possible to understand how they can argue and justify these same strategies, this being a dimension in which the students revealed difficulties, beyond to transposing their oral arguments into written. In addition, the influence of group work on solving the tasks was analysed, namely the aspects and reasons that affected the choice of strategies. After having shared all the strategies, the students chose to reach a consensus on which one to use for the final answer, opting for the simplest strategies. In the last task, it was noticeable that the students chose to solve it using mathematical language, showing progress in mathematical communication through their understanding of the proposed situations.

Keywords: Strategies, Mathematical Representations, Mathematical Justifications, Algebraic Thinking.

21560 | Mathematical Homework Potential

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Background & Aim: This research is under development in the context of the Supervised Teaching Practice of the Master in Mathematics Teacher Education for Middle and Secondary Schools. It aims to understand, from the viewpoint of students and mathematics teachers, how homework can be potentialized to promote mathematical learning. The motif for this research arose from the Teaching Practice experience, from the relationship that the students seemed to have with the mathematics homework. In addition to the fact that there were many situations of homework completion, the time spent correcting homework was too much and the students did not seem to get the most out of this moment in class. **Methods:** A mixed approach was chosen, in the context of a class of sixteen 7th grade students, and eight teachers from the Mathematics Group of a school in the region of Porto. Questionnaires were applied to the students and teachers. Also, six mathematics homework tasks are to be assigned – varying the type of task, the time given for them to complete it and the type of correction done –, applying a questionnaire after assigning and correcting each one, and interviews are to be conducted. **Results:** In this state of the investigation, it is possible to understand that the adhesion to the homework doesn't seem to be related to how interesting the tasks are. The students continue to state that they do the homework to not get a missed homework remark, and they don't rate how interesting a task is in the intended way. Furthermore, they continue to prefer a correction done by the teacher, to which they are accustomed to. Thus, the alternative corrections, although increasing student engagement, have not been well accepted.

Keywords: Mathematics Homework Potential, Mathematics Homework Correction, Mathematical Learning.

21594 | Student autonomous work and challenging tasks in mathematics: group problem solving as an opportunity for students to exercise their autonomy

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Background & Aim: The present investigation, under development, inserted in the context of the Master's Degree in Mathematics Teaching in the 3rd Cycle of Basic Education and Secondary Education, has as its main goal to understanding how the exercise of students autonomy is provided by the task of solving problems in groups, seeking, in particular, to answer the following questions: (i) How does group problem solving contribute to the development of student autonomy?; and (ii) How does the process of decision-making and initiative take place by students when solving problems in groups? **Methods:** Following a qualitative and interpretative methodology, the investigation counts on the participation of an 11th grade Mathematics A class with 22 students in which the author of the investigation assumes the dual role of trainee teacher and researcher. Data collection involves a questionnaire, monitoring, audio-recording and documentary collection of the resolutions of two problem tasks worked on in groups and an interview with each of the groups, after applying the two tasks. **Results:** This study has shown that, on the one hand, students find it difficult to carry out group problem-solving tasks autonomously. On the other hand, these same tasks are an opportunity to promote the development of students' autonomy, as they provide an opportunity for students to think, share and discuss problem-solving strategies with each other and reach a consensus, motivating them to act autonomously.

Keywords: Student Autonomy, Problem Solving.

21598 | Math learning from the ATENA Project: perception of students and teachers

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Background & Aim: The ATENA Project consists of a set of tasks designed to maximize student's interest and development in math. Students aged between 11 and 14 will work as a team throughout the year to solve the proposed tasks. At the end of each work session, tasks are corrected, and the teams' rankings are published. This poster presents an ongoing investigation in the context of Initiation to Professional Practice, in master's degree in mathematics teaching in the 3rd cycle of Basic and Secondary Education, at the Faculty of Sciences of the University of Porto, Portugal. The aim is to understand how the ATENA Project contributes to student's mathematical learning. **Methods:** Data collection will be done through the analysis of the proposed tasks, the project regulations and description, the classifications obtained by the students, and through questionnaires and interviews. Ethical issues are ensured by voluntary participation expressed in consent from student's guardians and the school's principal, and assent from students. **Results:** Preliminary results indicate that the types of tasks proposed by the ATENA Project focus on various types for students in the 7th and 9th years of school to solve together. Furthermore, the proposed tasks are related to the level of interest in mathematics. It is also noteworthy that the ATENA Project tends to promote Mathematical Reasoning, Problem Solving, and Mathematical Communication.

Keywords: Math learning, ATENA Project, Math Teaching.

22038 | The Metacommutation Problem in the Hurwitz Integers

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Background & Aim: In modern mathematics, the study of arithmetic is not limited to the Natural Numbers. In fact, there are sets that have many interesting properties from the arithmetical point of view. Two examples of those sets are the Lipchitz Integers and Hurwitz Integers, which are subsets of the Hamilton Quaternions. In these sets, we can prove results we could not prove in the natural numbers and, in a way, translate them back to the natural numbers. One important property is that in the Hurwitz Integers, we have a division algorithm which yields a form of "unique factorization" that motivates a problem we call the metacommutation problem. We aim to study some properties of the metacommutation map. **Methods:** In this work, we inspire ourselves with the results of the paper by H. Cohn and A. Kumar which tells a way to calculate the sign of the metacommutation map and the number of fixed points. With this arises the need to use techniques from different areas of mathematics such as Number Theory, Algebraic Geometry and Combinatorics. **Results:** We find some properties that describe the cycle structure of the metacommutation map. For example, we discover that for an odd prime p if we find a Hurwitz Prime Q such that the square of its trace is congruent modulo p to two times its norm, then the cycles which are not fixed points are all 4-cycles. **Conclusions:** With our work, we gain a better understanding of how the metacommutation map behaves and that may inspire other people to find more fascinating properties about this map.

Keywords: Arithmetic, Quaternions, Hurwitz Integers, Metacommutation Problem.

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22109 | Type Ia Supernovae host galaxies: a local vs global perspective of host galaxy effects on SN Ia luminosity using VLT/MUSE IFS data

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Background & Aim: Type Ia Supernovae hold paramount importance as standard candles within the field of cosmology, yet the robustness of their luminosity as a calibration measure can be subject to the characteristics inherent to their host galaxies. This research project delves into an in-depth comparative study of the local and global properties within SN Ia host galaxies, aiming to delineate their influence on supernova brightness, using the comprehensive, high-resolution data obtained through Integral Field Spectroscopy (IFS) via the MUSE instrument on the Very Large Telescope (VLT). **Methods:** Utilizing advanced, IFS data, we implement a detailed spaxel-by-spaxel analysis, meticulously examining individual spatial pixel elements (spaxels) to reveal unique spectral signatures within these galaxies. Stemming from an intensive high-performance computing project, this technique allows a meticulous, pixel-by-pixel investigation of the galaxies, striving to illuminate the complex relationship between local environmental factors - such as stellar mass, metallicity, and star formation rates - and their overarching influence on SN Ia luminosity. **Results:** (Preliminary results) We arrive to the conclusion that certain aspects are systematically underestimated. We used the newly derived corrections as a function of redshift to make corrections of a known sample of SN Ia hosts and derive cosmological parameters. We show that these corrections have a small impact on the derived cosmological parameters. While the systematic errors found do not significantly affect the derived cosmological parameters, it is an important source of systematic error that needs to be corrected for as we enter a new era of precision cosmology. **Conclusions:** Ultimately, by deepening our understanding of these intricate correlations, this study aspires to bolster the use of SN Ia in precision cosmology, providing more definitive insights into the mechanisms driving cosmic expansion and the fundamental nature of the universe.

Keywords: Cosmological Parameters, Supernovae.

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BIOLOGICAL SCIENCES

LJUP
17.^a EDIÇÃO

21355 | Systematic and automated aerial surveys of rocky intertidal communities using unmanned aircraft systems

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Background & Aim: The growing need to understand the key implications of climate change in intertidal communities involves the fundamental requirement of measuring biodiversity as well as community structure and function. Regular assessments of biodiversity, however, can be demanding and time-consuming. This is especially true for intertidal communities, which, given the strong habitat variability and temporal dynamics, require frequent and comprehensive surveys to obtain meaningful information. Therefore, developing innovative and effective survey methodologies has become a pressing challenge. Unmanned Aircraft Systems (UAS), commonly known as drones, offer great promises in this regard due to their ability to survey large areas more quickly. This project aims to evaluate the effectiveness of drones and creating reproducible flight protocols, to conduct automatic biodiversity surveys on rocky shores. **Methods:** Monthly drone surveys from the shores of Aguda to Moledo do Minho will take place throughout the year. The drone will be pre-programmed for each mission to capture a predetermined number of photos. These images will be merged post-flight to produce a comprehensive, detailed view of the surveyed areas. The survey data will be processed using WebODM® and PhotoQuad®. **Results:** The outcome of the aerial surveys should be high-quality images that enable the identification and quantification of major habitat providers, such as mussel beds and macroalgae patches. This way, we expect to establish baselines and rapidly assess major changes in the distribution and abundance of key species on some rocky, enabling us to discern significant seasonal variations, species patterns, and unforeseen events impacting the intertidal communities. **Conclusions:** With this work, it will be possible to understand the major pros and cons of the use of innovative technologies like drones to assist the study of the climate change impacts on intertidal communities.

Keywords: Intertidal, Climate Change, Rocky Shores, Biodiversity, Monitoring.

Acknowledgments

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21414 | Bioprospection of sponge associated actinobacteria for the discovery of new antibiotics under the One Health approach

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Background & Aim: The misuse and overuse of antibiotics have led to a crisis of antimicrobial resistance, intrinsically linked to the development of bacterial mechanisms to resist and survive these toxic compounds [1]. In response some bacteria can produce a polymeric matrix, known as biofilms, serving as an additional resistance mechanism [2]. Exploring new antibiotics to combat antimicrobial resistance is crucial, and, in this respect, marine actinobacteria are a promising source of new antimicrobial compounds [3]. This work aims to elucidate the antimicrobial potential of extracts from marine sponge-associated actinobacteria against a range of clinically relevant bacterial species. **Methods:** In the preparation of the actinobacteria extracts, each strain was initially cultured on the appropriate solid medium, followed by transfer to liquid medium with identical composition. Subsequently, amberlite resin was added, and after two weeks of growth, cultures were centrifuged and the pellet was subjected to freeze-drying. The resulting biomass was extracted with an acetone/methanol (1:1 v/v) solution, dried and weight before adding DMSO to achieve a stock concentration of 10 mg/mL. The extracts were tested at a concentration of 1mg/mL using the disk diffusion assay with ATCC strains. For resistant strains, the synergy test was conducted, by combining diluted extracts with the antibiotic to which they exhibited resistance. **Results:** Two extracts of *Streptomyces* and six of *Micromonospora* showed antimicrobial activity against *Staphylococcus aureus* and *Enterococcus faecalis* (Fig.1 and Fig 2). Regarding disk synergy testing, 2 extracts of *Streptomyces* and 3 extracts of *Micromonospora* displayed antimicrobial activity against VRE and MRSA strains. **Conclusions:** The preliminary findings revealed antimicrobial activity, within extracts from sponge-associated actinobacteria against relevant pathogenic, highlighting the imperative need for further exploration into their antibiotic potential.

Keywords: Antimicrobial Resistance, Biofilm, Antibiotics, Actinobacteria.

Acknowledgments

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Figure 1: Results of the disk diffusion test with *Enterococcus faecalis*

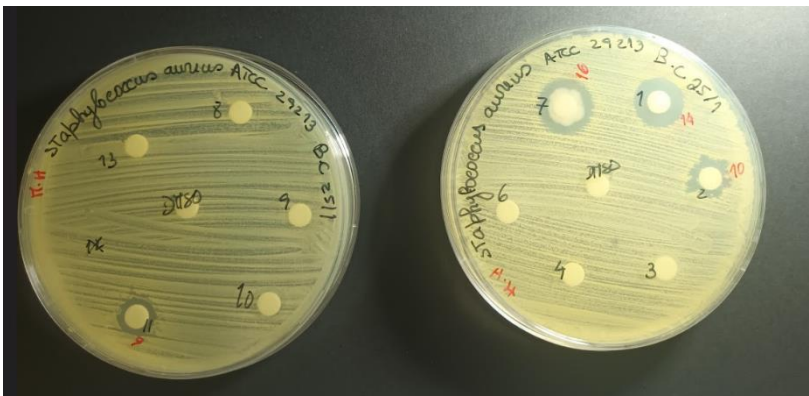


Figure 2: Results of the disk diffusion test with *Staphylococcus aureus*

21420 | Exploring Environmental Microbes as Biocontrol Agents of *Drosophila suzukii*: Impact on Adult Survival, Larval Development and Metabolic Pathways

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Background & Aim: *Drosophila suzukii* (SWD) is a major pest of small berries, posing an economic threat to producers, due to the lack of effective eradication methods [1]. *Drosophila* spp. metabolic pathways and fitness are impacted by gut-microbiota [2], and pathogenic microorganisms have been explored as SWD biocontrol agents [3,4]. The aim of this work (Figure 1) was to evaluate the impact of 3 bacterial isolates on SWD development, lifespan and metabolic pathways, to assess their potential as SWD biocontrol agents. **Methods:** Bacterial isolates: 1 *Bacillus* sp. (MCU_B5) and 1 *Pseudomonas* sp. (MOAZ21F2_1), retrieved from the guts of wild SWD, as well as *B. thuringiensis* (TUREX) were used. Adult survival: 10 flies (3-5 days old) were randomly selected and transferred to vials containing instant *Drosophila* food (Carolina, USA) mixed with the bacterial suspensions. Flies fed for 48h, were transferred to sterile food, and monitored up to 40 days. Larvae development: SWD Larvae were exposed to the same bacterial suspensions, and development was monitored up to 5 days. Adult eclosions were also monitored. Statistics: Assays were performed in three independent replicates and Data was analyzed on GraphPad9 (Prism), using the 2-way ANOVA multiple comparison method. **Results:** Adult survival: No differences were observed for MOAZ21F2_1 or TUREX treatments, while MCU_B5 led to precocious deaths. Pupation: No differences were observed for MOAZ21F2_1 treatments. MCU_B5 and TUREX led to significant differences in the highest doses. Eclosion: Differences were observed for MOAZ21F2_1 in the highest dose. Less adults emerged from MCU_B5 and TUREX infected pupae. Defense pathways: RT-qPCR work is ongoing. Impact on SWD immune defenses is anticipated to be more accentuated in both *Bacillus* spp., as they impaired development, and recent studies (namely ones using BT) support this data. **Conclusions:** Isolates affected SWD survival and development, thus being candidate biocontrol agents.

Keywords: *Drosophila Suzukii* (SWD), Biocontrol, Entomopathogens, Defense Pathways.

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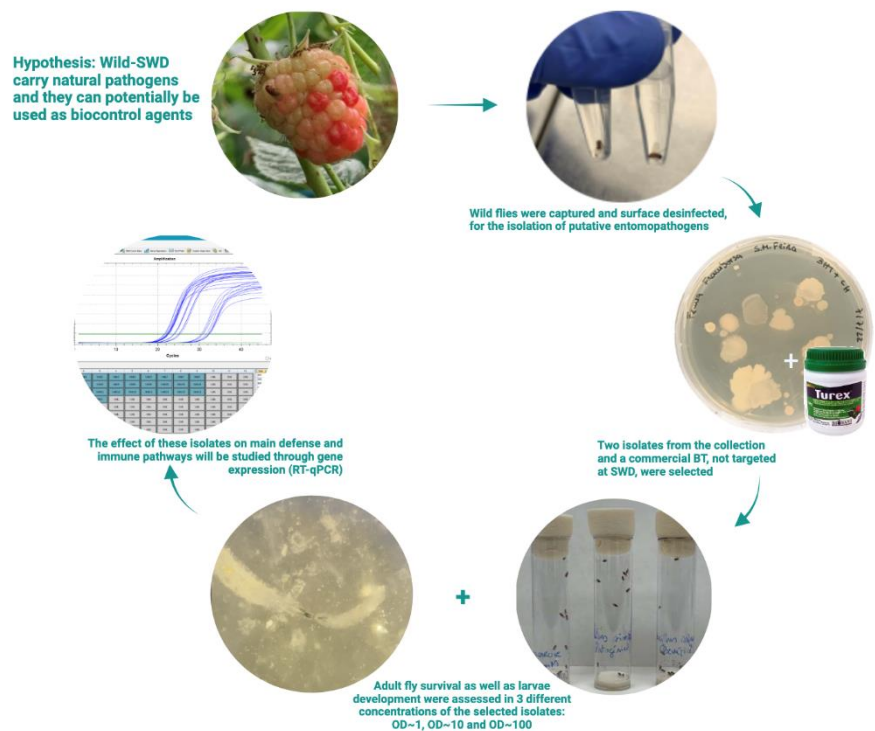


Figure 1: Graphical summary – hypothesis and workflow.

21433 | Innovative rutin-loaded lipid micelles for topical administration: formulation development and rheological profile

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Background & Aim: Rutin, also known as vitamin P, is a polyphenolic flavonoid present in several plants, such as passion fruit, buckwheat, birch leaves, green tea, apple, neem, and citrus fruits [1, 2]. Several reports document that rutin has a wide range of interesting properties such as antioxidant, antidiabetic, antiviral, anticancer, anti-inflammatory, anti-allergic, antibacterial, anti-arthritic, and neuroprotective properties [3-5]. Furthermore, rutin is also used in dermo cosmetic products, such as anti-aging and healing products for atopic and allergic skin, mainly due to its antioxidant properties [6]. However, the use of rutin in dermal products has its limitations. This compound is lipophilic, which results in low solubility and low stability in water [7]. As a result, rutin cannot be used efficiently in dermal products due to its insufficient permeation rate into the skin [8]. To overcome these problems, new ways of increasing the beneficial effect of rutin on the skin, such as drug delivery systems, have been considered.

Methods: In our work, we describe the development and optimization of rutin in lipid micelles to improve its skin permeation. For the production of micelles, the hot homogenization technique was selected, using a sonicator and an ultra-turrax, both for 5 minutes. The dispersions were subsequently stored at two different temperatures (4°C and 25°C) and were monitored for their particle size, polydispersity index, zeta potential and rheology. **Results:** Rutin-loaded micelles of mean size 82.23, PDI 0.2433, and Zeta -59.86, were obtained with 0.6% of Tween 20 and 0.4% of Span 80 which were further characterized using the oscillation frequency sweep test. **Conclusions:** Optimized lipid micelles suitable for topical application were successfully produced and now being considered for skin permeation studies in Franz diffusion cells.

Keywords: Rutin, Flavonoid, Antioxidant, Lipid Micelles, Skin Permeation.

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21443 | Metabolic pathways of caffeine degradation by *Pseudomonas putida*: a mini-review

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Background & Aim: Caffeine (1,3,7-trimethylxanthine) is one of the most consumed pharmacologically active substances, usually through beverages (coffee, tea and soft drinks) and foodstuffs containing cocoa or chocolate [1]. With the resurgence of scientific evidence proving the environmental harm of caffeine, researches on its degradation by microbial, fungal and enzymatic methods (more eco-friendly) have been conducted [2]. *Pseudomonas putida* is capable of using caffeine as a source of nutrients and energy [2,3]. The ability to convert caffeine into simpler and more environmentally friendly metabolites makes it a potential tool for biodecaffeination and environmental remediation [3]. The aim of this work was to briefly review the currently proposed and tested pathways for caffeine degradation by *Pseudomonas putida*, and the respective metabolites. **Methods:** A literature search was carried out using Scopus and Pubmed. The keywords “*Pseudomonas putida*” and “caffeine” were applied as filters and several inclusion and exclusion criteria were applied to focus on the topic under study. **Results:** According to the selected material, *Pseudomonas putida* displays a *N*-demethylation catabolic pathway for caffeine degradation [3]. During this process, caffeine suffers an initial demethylation, resulting in theobromine and paraxanthine. The next step is a second demethylation of both metabolites to form 7-methylxanthine, which goes through another demethylation to form xanthine [2,3]. At the end, xanthine is converted to uric acid before entering the normal purine catabolic pathway, resulting in carbon dioxide and ammonia [3,4]. **Conclusions:** These results corroborate the proposed potential of *Pseudomonas putida* as a bio-converter of caffeine to non-contaminant metabolites for environmental remediation. They also support the possibility of alternative commercial production of certain xanthines from coffee wastes[2].

Keywords: *Pseudomonas Putida*, Caffeine, Caffeine Degradation, *N*-Demethylation.

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ATXN3

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Background & Aim: Machado-Joseph disease (MJD) is a rare, genetically determined, and highly incapacitating disease caused by expansion of a polyglutamine tract in the protein ataxin-3 (ATXN3). This mutant protein is prone to aggregate and has toxic effects in neuronal cells, leading to their demise [1]. There is currently no effective disease treatment. Considering the dominant impact of mutant ATXN3 in neurons, its selective removal is considered a potential approach for the treatment of MJD. Small molecule-based therapies able to induce targeted protein degradation could become clinically relevant [2,3]. However, for the success of this strategy an atomic level understanding of the druggable binding sites that are unique to the mutant ATXN3 is paramount. **Methods:** Presently, no complete experimental structure is available for the normal or mutated forms of ATXN3. In this work, a combination of molecular modelling using the partial experimental structures available, with the use of AlphaFold and large atomistic molecular dynamics simulations (3 x 1000 ns) was used. This strategy enables the creating of high-accuracy fully atomistic 3D models of the wild-type and mutant ATXN3, representing the dominant conformations of these two proteins. **Results:** The two models created were characterized by the application of different pocket/cavity hunting programs (Ghecom, CastP, Cofactor, DeepSite, Pocasa, FTSite, DoGSiteScorer). A promising cavity in the mutated ataxin-3 was identified, encompassing part of the amino acid residues from the expansion of the PolyQ track that characterize the mutant form, and suggesting a possibly selective strategy for interfering with only the mutated form. **Conclusions:** A promising selective druggable cavity was identified in mutant ATXN3. This cavity is now being explored by structured-based virtual screening methods for the selection of candidates for synthesis and biological evaluation.

Acknowledgments

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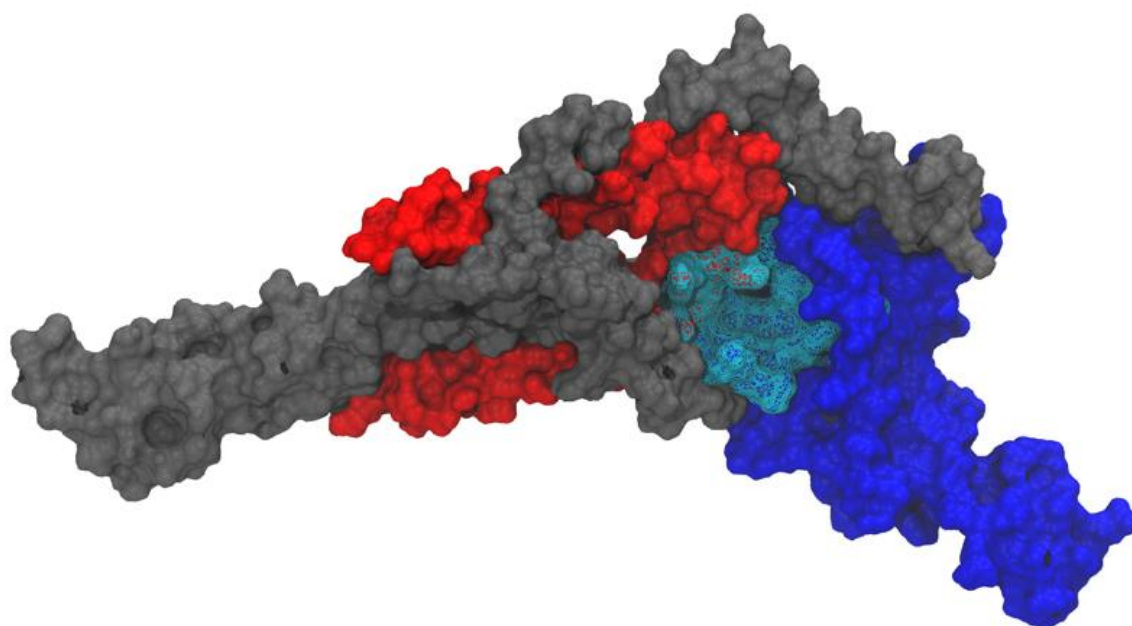


Figure 1: Promising selective druggable cavity identified in the mutated form of ATXN3. Represented in blue is the stable Josephine domain, in red the PolyQ region and the wireframe represented in cyan corresponds to the pocket surface between these two regions.

21469 | *In vitro* evaluation of Prrxl1 transcriptional activity on genomic regulatory regions from genes related to nociceptor differentiation

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Most pain-sensing neurons, known as nociceptors, reside primarily in the dorsal root ganglia (DRGs), along with mechanoreceptors and proprioceptors and are crucial for relaying somatosensory information. Despite progress in identifying key transcription factors involved in the differentiation of these neuron subtypes, the underlying molecular mechanisms remain elusive. Our project aims to tackle these mechanisms, offering potential for clinical translation in chronic pain management and neuron regeneration. We investigate the genetic program controlled by the transcription factor Prrxl1, which is specifically expressed in nociceptors within the DRGs. Mice lacking Prrxl1 exhibit abnormal neuronal migration and differentiation, emphasizing its crucial role in circuit formation [1]. Utilizing a genomic approach, which were previously used to uncover Tlx3 transcription factor target genes [2], we identified a list of putative Prrxl1 target genes in embryonic DRGs. In this project, we aim at understanding how Prrxl1 acts at the enhancer level of its target genes, which are co-expressed with Prrxl1. Thus, we selected a set of Prrxl1-bound enhancer regions related with genes that are associated with nociceptor differentiation and constructed luciferase reporter plasmids. Now, we are performing luciferase reporter assays using a cell line with nociceptor-like properties to analyze Prrxl1 transcriptional activity on the selected enhancers. In addition, we plan to assess which sites mediate Prrxl1 transcriptional activity through site-directed mutagenesis of putative binding sites. With this work, we expect to give insights on how Prrxl1 acts on the specification of developing nociceptors into diverse subtypes, possibly by directly promoting and repressing different sets of target genes involved in the differentiation of nociceptive alternative subtype fates.

Keywords: Dorsal Root Ganglia, Prrxl1, Nociceptors, Transcriptional Regulation.

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21470 | Evaluation of *Prrxl1* transcriptional activity on genomic regulatory regions from genes involved in mechanoreceptor and proprioceptor differentiation

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The dorsal root ganglion (DRG) neurons are heterogeneous and can be divided in three main subpopulations, namely mechanoreceptors, proprioceptors and nociceptors. During development, these lineages differentiate into diverse neuron subtypes by the interplay between extracellular cues and cell-intrinsic genetic programs controlled by transcription factors. While the importance of transcription factors in the generation of neuronal diversity is well established, the understanding of molecular mechanisms behind their function remains limited. The transcription factor *Prrxl1* is specifically expressed in developing DRG nociceptors [1,2]. Previously, our team was able to identify a list of putative *Prrxl1* target genes in embryonic DRGs. This experimental strategy was recently proved successful on the identification of target genes controlled by the transcription factor *Tlx3* [3]. Departing from a group of target genes that are directly repressed by *Prrxl1* in embryonic DRGs and that are not co-expressed with *Prrxl1*, we aim to evaluate how *Prrxl1* acts at the enhancer level. For that, we selected 4 enhancers and constructed luciferase reporter plasmids. Using a cell line with nociceptor-like characteristics, we are currently evaluating *Prrxl1* transcriptional activity on these enhancers, which putatively control the expression of genes is not related to the nociceptor lineage. These genes appear to be repressed by *Prrxl1* in DRG nociceptors, as they are derepressed in *Prrxl1* knockout mice. If the selected enhancers prove to be *Prrxl1*-responsive, we intend to perform site-directed mutagenesis of putative binding sites to identify which sites mediate *Prrxl1* transcriptional activity. We expect to provide new insight into how *Prrxl1* acts on the specification of developing nociceptors, possibly by directly repressing genes involved in the differentiation of mechanoreceptive and proprioceptive alternative fates.

Keywords: Dorsal Root Ganglion, *Prrxl1*, Neuronal Cell Line, Transcriptional Assays.

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This work was conducted with the support of our technician Anabela Silvestre.

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21471 | Ecological State and Microplastic Assessment at the Mouth of the Douro River Estuary, Portugal.

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Background & Aim: The study of estuarine ecosystems has become crucial due to the increase of several threats (e.g. climatic change, pollution). This study aims to assess the ecological status of the Douro Estuary according to the Water Framework Directive, with a focus on the presence and characterization of microplastics (MPs). **Methods:** Four sampling sites were defined next to the estuary's mouth and physical and chemical parameters were measured in October 2022. Additionally, water samples were collected for nutrient analysis and characterization of the phytoplankton community, sediments were gathered for the evaluation of the benthic macroinvertebrate community and MPs in the water column were sampled along transects using a planktonic horizontal trawl. **Results:** The results pointed to a water body classification with a reasonable chemical status but a mediocre ecological status. The phytoplankton community exhibit a wide abundance of species from *taxa* Bacillariophyta: *Nitzschia delicatissima*, *Leptocylindrus danicus*, *Synedra ehrenberg* and *Leptocylidrus minimus* at all sampling sites. The benthic macroinvertebrate community showed specific *taxa* as *Cerastoderma edule* (abundant at site 3) *Abra alba* (abundant at site 4), however, *Hediste diversicolor* e *Streblospio shrubsoli* was the most recorded species. AZTI's Marine Biotic Index (AMBI) demonstrated that site 1 (upstream) is moderately disturbed and the other sites are slightly disturbed. The majority of the gathered MPs comprised fibers (>80%), mostly black, with a size within the range of 1.001-2.5 mm, and in sites 3 and 4 (downstream). **Conclusions:** This study demonstrates the importance of sampling the parameters recommended by the Water Framework Directive to obtain a classification and assessment of the ecological potential of transitional and coastal waters. It also represents a multidisciplinary contribution to the urgent need for awareness and monitoring of marine litter in this type of water masses.

Keywords: Ecological Assessment, Phytoplankton, Macroinvertebrates, Microplastics.

21477 | Developing a machine learning model for *in-silico* aptamer development

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Background & Aim: Aptamers are small nucleotides that can to bind with high affinity and specificity to different molecular targets. These biomaterials are useful biomarkers that can be applied in detection of heavy metals and pollutants. Traditionally, aptamers are obtained through SELEX - Systematic Evolution of Ligands by Exponential Enrichment. It relies on repetitive incubation, washing and amplification of a randomized pool of nucleotides [1]. Despite effective, there are setbacks, namely affordability, access and maintainability. With that in mind, we aim to develop a machine learning model for designing aptamers *in-silico*. **Methods:** The first step of development, relies on the collection and compilation of large amounts of related data. As such, we compiled 5 key active aptamer databases into one. From that dataset, we started extracting molecular information relevant to the understanding of aptamer-protein interaction. **Results:** The resulting database comprises more than 2300 aptamer-target pairs, describing both aptamer and target in terms of their chemistry and interaction. Due to the diversity of the databases and the lack of standardization, there is a prevalence of missing information (such as detailed target description), which can difficult the development of a model. Despite difficulties in correcting it, one of the databases [2] can serve as a promising basis for early model development, being possible to complement it with some data augmentation. **Conclusions:** Aptamers display a promising future and combining their development with machine learning can drastically boost their accessibility and possible applications. Lack of a universal database leads to lack of coherence in the publicly available data [3]. To attempt to combat that in the development of a model, techniques such as data augmentation can be applied. This will allow extrapolation of key features to better understand aptamer-target interactions, and apply them in the development of a machine learning model.

Keywords: Aptamer, SELEX, *In-Silico*, Machine-Learning.

Acknowledgments

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21480 | Blossoming through History and Science: Botanical Specimens on Display at the Natural History and Science Museum of the University of Porto

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Background & Aim: This study focuses on the systematic selection of plant specimens for display at the Natural History and Science Museum of the University of Porto (MHNC-UP), aiming to enhance public understanding of botany and ethnobotany while promoting conservation and cultural appreciation through state-of-the-art museum exhibition design and botanical curation.

Methods: The methodology involves background research, including reviews of existing museum exhibits and relevant literature on botanical specimens and ethnobotanical knowledge. Selection criteria were developed considering botanical diversity, cultural, and educational value. A thorough review of the museum's herbarium duplicates collection was done. Specimens were evaluated according to established criteria, and preparations for display follow best practices in herbarium mounting and preservation. Collaboration with exhibit designers will result in an attractive layout with interpretive signage and interactive elements. **Results:** A diverse array of plants, chosen for their botanical, cultural, and educational significance, will be ready for display, aiming to create a dynamic and informative exhibit that will enhance public understanding. **Conclusions:** This study will demonstrate the effectiveness of a systematic approach to selecting and presenting plant specimens in museum displays. By integrating research, criteria development, and public engagement, the exhibition will not only promote conservation and cultural appreciation but also contribute to the advancement of museum exhibition design and botanical curatorial practices. The integration of botanical knowledge with public outreach initiatives serves to intensify the overall visitor experience and foster a deeper appreciation of the natural world.

Keywords: Botanical selection, Museum exhibit, Ethnobotany, Conservation, Public Engagement.

21486 | Investigating the impact of Enzyme Replacement Therapy on the invariant Natural Killer T cells in patients with Acid Sphingomyelinase Disease

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Background & Aim: Acid sphingomyelinase deficiency (ASMD) is a rare lysosomal disease caused by SMPD1 gene mutations, leading to sphingomyelin accumulation. Sphingomyelin restrains the activation of invariant Natural Killer T cells (iNKT), crucial for immune regulation. Consequently, upon this accumulation in ASMD mice and patients, there is a decrease in iNKT cell frequency [1], which can be prevented with Enzyme Replacement Therapy (ERT) in mice. ERT is currently the only approved therapy for ASMD. **Methods:** This study investigates the effects of ERT on iNKT cells in two Portuguese ASMD patients, undergoing bi-weekly ERT with an escalating dosage protocol: 8 mg/kg (week 0), 24 mg/kg (weeks 2 and 4), 48 mg/kg (weeks 6 and 8), 80 mg/kg (week 10), 160 mg/kg (week 12), 240 mg/kg (week 14). Analyzes through blood samples were done before-ERT and at 1, 3, and 6 months during ERT, and focused on PBMC isolation, iNKT cell isolation with MicroBeads and Flow cytometry extracellular staining. **Results:** Initial findings show no significant change in iNKT cells frequency or phenotype, even with maximum ERT dosage at 3 months. One of the patients interrupted ERT between 3 and 6 months, with no further analyses carried out after reaching the maximum ERT dosage. Regarding the additional patient, only one analysis has been performed after the maximum ERT dosage. **Conclusions:** Our current results indicate that no effects on iNKT cells are seen until maximum ERT dosage is reached, hinting at a possibly still inadequate dose of enzyme to allow changes in frequency and/or phenotype, or that disease progression is already too advanced for reversal with ERT, thus highlighting the critical role of early diagnosis in ASMD. While the presented results span only for 6 months post-ERT initiation, 3 months on full dose therapy, we plan to extend this research for over a year, while emphasizing the need for a larger recruitment of patients to enrich our analysis further.

Keywords: Acid Sphingomyelinase Deficiency, Lysosomal Disease, Invariant Natural Killer T Cells, Enzyme Replacement Therapy.

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**21489 | Unlocking Islands Repositories: cataloguing Madeira and Azores
Archipelagos' flora housed at University of Porto Herbarium- Natural History and
Science Museum of the University of Porto (MHNC-UP)**

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Background & Aim: The diverse flora of the Madeira and Azores archipelagos holds significant scientific and conservation value. Additionally, a comprehensive catalogue of specimens present in the worldwide herbaria is essential to research and management efforts. This study aims to systematically document and catalogue the flora specimens of Madeira and the Azores present at the University of Porto Herbarium at the Natural History and Science Museum of the University of Porto. **Methods:** A systematic approach was employed to catalogue the flora specimens at PO Herbarium. This involved digitizing and organizing herbarium collections, including collection time, origin data, and taxonomic identification, primarily, with the use of an Excel worksheet, and, eventually, the *In Patrimonium* platform, the Natural History and Science Museum of the University of Porto repository of data. Statistical methods were applied to analyze the biodiversity patterns and distribution of this particular collection. **Results:** The catalogue of flora specimens from Madeira and the Azores archipelagos has been successfully compiled. It includes a comprehensive dataset of plant specimens, encompassing a total University of Porto Herbarium collections survey. Preliminary analysis reveals rich biodiversity and unique plant distributions across the archipelagos. The analysis of endemic species provides even more insights into global flora distribution in space and time. **Conclusions:** The systematic catalogue of flora specimens provides a valuable resource for researchers, conservationists, and policymakers. It enhances our understanding of the flora of Madeira and the Azores, supporting conservation efforts and informing future research directions. This work will contribute to the advancement of botanical knowledge and conservation strategies in Portuguese island ecosystems.

Keywords: Herbarium Collections, Taxonomic Identification, Conservation Initiatives, Portuguese Island Biodiversity.

21492 | Pain in zebrafish (*Danio rerio*): studying the practical case of fin clipping

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Background & Aim: Zebrafish (*Danio rerio*) is a widely used model in research, being subjected to potentially stressful and painful procedures, such as fin clipping for genotyping and in regeneration studies [1]. Fin clipped zebrafish have increased ventilation, bottom-dwelling behavior, and reduced food intake [2]. Our aims are to clarify how long pain persists and whether different percentages of tail removed during fin clipping induces different pain degrees, as literature is unclear [3]. **Methods:** Eighteen adult mixed sex (1:1) AB zebrafish were randomly divided into 3 groups (n= 6): control group (only anesthetized), FCt group which animals had their caudal fin tip clipped, FC40% which animals had 40% of their caudal fin clipped. For acclimatization, animals were individually placed in a 2L tank for 2 days with visual contact with each other. After anesthesia with 175mg/ml MS222, the FCt and FC40% group tail were cut with a scalpel. After recovery in clean water, behavior was video recorded for 15 min at 0.5, 1, 3, 6, 24, and 48h post-procedure. Any-maze tracking software was used to analyze the videos for activity, distance, and space occupation. Latency to eat was also recorded before, 6h, and 30h after fin clipping. Data was analyzed using repeated measures ANOVA. **Results:** The study is ongoing, and the results will be presented in the congress. We expect a reduction in the bottom-dwelling and immobilization, and an increase in space occupation over time, particularly in fish with a minor portion of the fin cut. Preliminary results (n= 3-4) of the food latency did not show differences between groups or timepoints, only interaction between these factors (p= 0.048). **Conclusions:** Based on these results we will design a 2nd experiment to evaluate the effect of 5mg/L lidocaine analgesia on fin clipped fish. Should this study reveal minimal/no pain in the FCt groups, it will contribute to the refinement of the fin clipping technique for genotyping, wherein a small portion of fin is enough.

Keywords: Pain, Fin clipping, Behavior, Zebrafish.

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21497 | Survey of parasites of the genus *Kudoa* (Myxozoa) in the pouting (*Trisopterus luscus*) muscle

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Background & Aim: This work was carried out as part of a parasitological examination of samples of the pouting (*Trisopterus luscus* (Linnaeus, 1758)) muscle, more specifically a search for Myxozoa parasites of the genus *Kudoa* Meglitsch, 1947[1]. The work is of particular interest because the pouting is an economically important species and the presence of *Kudoa* parasites can cause the muscle to liquefy, making it unattractive to the consumer, and decreasing its commercial value in the market [2]. **Methods:** Muscle samples were taken from 90 pouting specimens (30 specimens per season in 2023, excluding winter). Briefly, one gram of muscle per fish was macerated in 1% phosphate buffered saline solution (PBS) and the resulting liquid was collected in a 1.5 ml Eppendorf tube. The tubes were centrifuged at 2100 xg for 15 minutes. The resulting pellet was resuspended in 100 µl of 1% PBS, then the spores were counted in a Neubauer chamber. **Results:** The prevalence of infection with *Kudoa* sp. spores was 7.8% (7/90) overall. By season, the highest prevalence of infection was in summer (20.0%) followed by autumn (3.3%). Infection intensity ranged from 485 to 198,250 spores per gram of muscle in summer (N=6) and was 4,091 in autumn (N=1). **Conclusions:** The pouting is a fish species susceptible to infection by parasites of the *Kudoa* genus. This infection is seasonal and more prevalent in the summer months. In individuals with high levels of infection, it is possible that they may show some changes in the texture of the muscle, but further studies are needed to confirm it.

Keywords: *Kudoa*, Pouting, Parasites, Seasonality.

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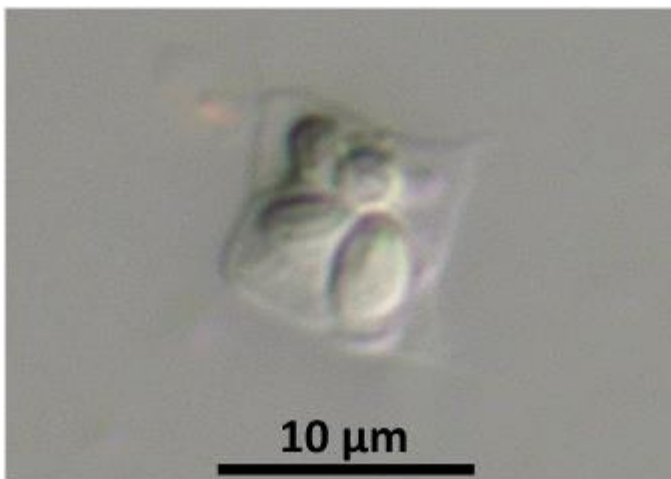


Figure 1: *Kudoa* sp. spore from *Trisopterus luscus*.

21505 | Is take-away Sushi microbiologically safe?

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Background & Aim: Sushi consumption is an expanding market due to trending changes in diet patterns in the western countries. It is much appreciated and, therefore, currently there is a great offer in restaurant and take-away services. Nevertheless, as sushi comprises raw perishable ingredients and requires extensive manual handling during preparation, it is recognized as posing potential risks for foodborne illness. **Methods:** In this work, take-away sushi from a supermarket (comprising several different sushi-types, such as nigiri and maki) was analyzed applying international standard (ISO) methods. The microbiological quality involving quality parameters (enumeration of total microorganisms), hygienic parameters (enumeration of *Enterobacteriaceae* and *Escherichia coli*) and the enumeration/detection of pathogenic agents (enumeration of *Staphylococcus coagulase-positive*, *Bacillus cereus* and detection of *Salmonella*, *Listeria monocytogenes* and enteropathogenic *Vibrio spp.*) was assessed. **Results:** All microbiological parameters were considered satisfactory as the results were in accordance with the established microbiological criteria (INSA criteria), including the quality and the hygienic parameters. Furthermore, none of the searched pathogenic agents was detected. **Conclusions:** This preliminary study showed favorable results revealing good handling practices and food safety standards for commercial take-away sushi and consequently the public health protection.

Keywords: Sushi, Take-Away, Microbiological Quality, Food Safety.

21512 | Isolation and characterization of *E. coli* bacteriophages for use in diabetic foot infections

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Background & Aim: Diabetic foot ulcers (DFUs) are chronic wounds that can affect up to 34% of diabetics during their lifetime [1]. DFUs often become infected (IDFUs) by multidrug-resistant bacteria, including *Escherichia coli* [2], leading to tissue necrosis, osteomyelitis, and, ultimately, amputation. Bacteriophages (phages) are bacteria-specific viruses shown to be promising in resolving bacterial infections. Herein, we propose the use of bacteriophages (phages) to treat IDFUs colonized with *E. coli*. **Methods:** Phages were isolated from a commercial phage cocktail and characterized according to their spectrum of activity against 18 clinical *E. coli* isolates, plaque morphology, virion morphology by transmission electron microscopy (TEM), and growth parameters through one-step growth experiments. **Results:** In total, 5 phages were isolated. In terms of plaque morphology, their size varied between 0.6 mm and 2.4 mm, and some were surrounded by a halo ($\varnothing_{\max}=4.8$ mm). TEM analysis showed phages belonging to three different families, the formerly known *Myoviridae* (long contractile tail), *Siphoviridae* (non-contractile tail), and *Podoviridae* (short tail). The spectrum of these phages was tested against the clinical isolates, 50% (9 isolates) of which were multi-drug resistant (MDR), and 22% were single antibiotic resistant (SAR) (4 isolates). The lytic spectrum, including activity due to lysis from without, varied between 33% (phage 5) to 78% (phage 4). Combining all five phages resulted in the death of 89% of the strains tested, including 8 MDR and 3 SAR. Finally, the one-step growth experiment showed varied latent periods and burst sizes. **Conclusions:** We have successfully isolated and characterized different phages that were effective against a panel of clinical strains, including most of the antibiotic-resistant and multi-drug-resistant strains.

Keywords: *E. Coli*, Phage, Diabetic Foot Ulcer, Infected Diabetic Foot Ulcer.

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21515 | Antimicrobial Susceptibility and Genomic Analysis of *Corynebacterium* spp. from the Female Urinary Microbiome

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Background & Aim: *Corynebacterium* genus is frequent within the female urinary microbiome (FUM) with a high species diversity. However, their influence on urinary tract health is understudied. This work aimed to explore antimicrobial susceptibility, genetic factors related to resistance and virulence, as well as the presence of gene clusters encoding antimicrobial peptides (AMP) in *Corynebacterium* spp. isolated from FUM. **Methods:** *Corynebacterium* spp. (n=35) from healthy FUM were analyzed for antibiotic susceptibility using the disk-diffusion method. Resfinder and CARD databases identified acquired antimicrobial resistance (AMR) genes, while VFDB and BAGEL4 databases predicted virulence and AMP-encoding genes, respectively. Mutations of *gyrA* and *rpoB* genes were analyzed with the Clustal Omega Program. **Results:** All isolates were susceptible to vancomycin, tetracycline, and linezolid. Resistance rates to clindamycin, ciprofloxacin, moxifloxacin, penicillin, and rifampicin were 80%, 25.7%, 20.0%, 8.6%, and 5.7%, respectively. 77.1% of isolates carried one or combinations of AMR genes (*ermX*, *tetA*, *aac(3)-XI*, *aph(3′)-Ia*, *aph(3′′)-Ib*, *aph(6)-Id* and *cmx*) typical of Gram+ or Gram- bacteria. Notably, 67.8% of the clindamycin-resistant isolates harbored the *ermX* gene. Mutations in the *gyrA* and *rpoB* genes correlated with resistance to fluoroquinolone and rifampicin, respectively. One isolate was multidrug resistance. Most predicted virulence genes were associated with adhesion, and iron acquisition and regulation. The AMP lactococcin 972 and lanthipeptide were predicted in 8.5% and 5.7% of the isolates, respectively. **Conclusions:** *Corynebacterium* spp. may serve as a key vector for AMR gene dissemination in the urinary microbiome, a role not previously recognized. Moreover, the prevalence of adhesion and iron uptake genes, coupled with certain species potential to produce AMP, underscores their ability to colonize and thrive in the urinary tract, potentially influencing in the structure and health of the FUM.

Keywords: *Corynebacterium*, Female Urinary Microbiome, AMR Genes, Antimicrobial Peptides, Virulence.

21525 | Evaluation of Antimicrobial Peptides (AMPs) bioactivity towards the foodborne pathogen *Listeria monocytogenes*

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Background & Aim: The persistent use of antibiotics has led to the emergence of multi-drug resistant pathogenic bacteria, thus a demand for the development of novel and sustainable antimicrobial technologies has urgently increased. Antimicrobial peptides (AMPs), which consist of short amino acid sequences (around 10 and 50), were revealed as promising substitutes to antibiotics. *Listeria monocytogenes* is a ubiquitous species of Gram-positive bacteria and a human foodborne pathogen responsible for listeriosis, a possibly fatal condition (20-30% mortality rate) for risk groups, including pregnant women and immunocompromised individuals. In this study, the antimicrobial susceptibility of *L. monocytogenes* to eight AMPs (BP100, CA-M, D4E1, Dhvar-5, 3.1, RW-BP100, BP178, BP358) was evaluated. **Methods:** AMPs were first screened by antibiograms, at the following concentrations: 0.5, 1.15, 3.79, 10, 25, 50, and 100 µM. Then, the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were obtained by exposure to each AMP at 0.25, 0.5, 2, 4, 7, 10, 20, 30, and 70 µM. **Results:** The preliminary screening revealed that all tested AMPs affect *L. monocytogenes* growth in different concentrations. However, D4E1 was the most effective in preventing growth at all concentrations. Contrarily, BP178 and BP358 did not fully inhibit bacterial growth at any of the tested concentrations. This is still an ongoing work, but preliminary MIC and MBC results confirm that D4E1 and 3.1 peptides are the most effective peptides, with MIC and MBC of 2 and 4 µM, respectively. **Conclusions:** Although these are still preliminary results, they suggest a promising efficacy of the chosen AMPs, particularly D4E1 and 3.1, to control *L. monocytogenes*. These results, allied to further assays (e.g., cell viability, cytotoxicity) are important to understand how reliable it is to replace antibiotics with AMPs as a more sustainable option.

Keywords: Antimicrobial Peptides, Sustainable Strategy, *Listeria Monocytogenes*.

21526 | Modulation of the osteosarcoma microenvironment by engineering osteoclasts with non-coding RNAs

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Background & Aim: Osteosarcoma (OS) stands as the most common primary bone cancer among children and young adults. Highly activated osteoclasts (OCs) within the bone microenvironment play a significant role in the progression of OS. This project aims to assess the influence of non-coding RNA engineered osteoclasts (OCs) on the progression of OS. **Methods:** CD14⁺ monocytes were isolated from blood donors and differentiated into mature OCs using α -MEM supplemented with M-CSF and RANKL. OCs were transfected with miR-16 mimics and a small interfering RNA against *DLEU1* and its conditioned-media was collected at day 5 and 12, mimicking the fusion and resorption stages [1]. Several OS cell lines (U2OS, SAOS-2, MG-63 and 143B) were cultured in three different media (DMEM, α -MEM and a combination of both (50%/50%)) either in TPCS or bone slices. Proliferation and metabolic activity were assessed in the different conditions by cell counting, ki-67 immunofluorescent staining and resazurin. The OS cell lines will be cultured with the OCs' conditioned-media and proliferation, cell cycle and apoptosis will be analysed. **Results:** Since OCs were cultured in α -MEM we decided to test its effect, as well as a combination of 50% α -MEM and DMEM high glucose, and only DMEM high glucose in the OS cell lines. We concluded that all OS cell lines could grow in α -MEM and an increase in the proliferation was observed for SAOS-2 when compared to DMEM high glucose. Given the impact of the matrix on tumour growth, we tested the use of bone slices against tissue culture plates and found that proliferation was intensified for SAOS-2 and MG-63 cells cultured on bone slices. Having these results in consideration we will choose two OS cell lines to further test the RNA-engineered OCs conditioned-media on top of bone slices. **Conclusions:** Herein we optimized an *in vitro* model to test the effect of the RNA-engineered OCs' conditioned-media on the OS cells. Later we plan to explore the consequences of direct cell-to-cell contact by culturing both OS cells and the engineered OCs within a 3D model.

Keywords: Osteosarcoma, Non-Coding RNA, Osteoclasts.

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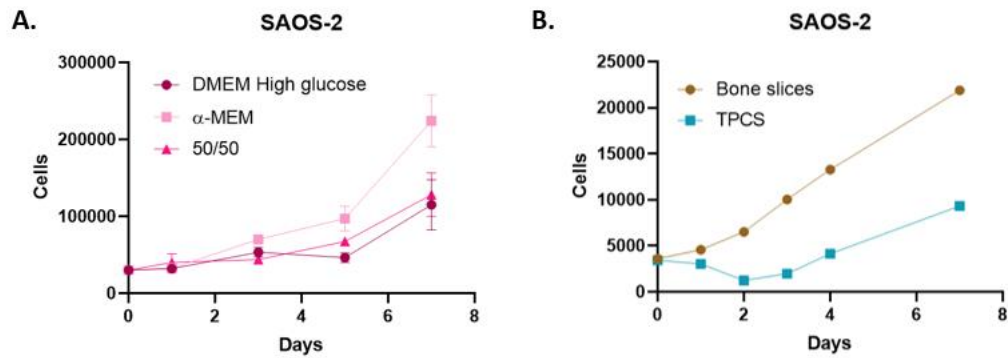


Figure 1: A. SAOS-2 cell line growth profile in DMEM high glucose, α -MEM and a combination of both (50%/50%) evaluated by cell count. Increased proliferation is observed when cultured with α -MEM. **B.** SAOS-2 cells proliferation is higher when cultured in bone slices compared to TPCS, both in α -MEM.

21545 | Toxicological assessment of nitrosamines with emerging interest throughout the urban water cycle

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Background & Aim: Water treatment is a fundamental tool to guarantee safe consumption of water. However, during this process, the reaction of disinfectant agents (such as chlorine) with organic matter and chemical precursors (i.e. hormones, pharmaceuticals) present in raw water can lead to the formation of disinfection by-products (DBPs)¹. Nitrosamines (N-DBPs) are a family of DBPs that are considered highly toxic, and many of its members, including N-nitrosodiethylamine (NDEA) and N-nitrosodimethylamine (NDMA) are classified as probable human carcinogens (B2)^{2,3}. The majority of DBPs (including N-DBPs) stand unregulated, and the knowledge considering their hazard assessment and potential mode of action remains scarce¹. In this project we aim to produce new knowledge considering the potential developmental toxicity of three nitrosamines [NDMA, NDEA and N-Nitroso-N-methyl-4-aminobutyric acid (NMBA)] using bioassays performed with the zebrafish (*Danio rerio*) animal model. **Methods:** For a period of 96 hours post fertilization, zebrafish embryos were exposed to different concentrations of each target nitrosamine, with periodic observations every 24 hours to assess developmental stages and maintain necessary conditions. The assessment took in consideration mortality, morphological abnormalities, and alterations in sensory-motor behavior. **Results:** Considering preliminary results, the effects regarding morphological abnormalities varied between 2,1%-8,3% to NDMA, 0%-81,3% to NDEA, and 8,3%-31,3% to NMBA exposure. When considering mortality, effects varied between 0%-4,2% to NDMA, 0%-25% to NDEA, and 4,2%-54,2% to NMBA exposure. Regarding alterations in behavior, the effects varied between 0%-4,2% to NDMA, 0%-85,4% to NDEA, and 2,1%-20,8% to NMBA exposure. **Conclusions:** This study highlights the need to improve the knowledge surrounding DBPs, considering N-DBPs potential toxicity in drinking water.

Keywords: Zebrafish, Disinfection By-Products, Water Treatment, Drinking Water.

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21553 | Exploring the mercury dynamics in arctic permafrost microbial communities

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Background & Aim: The warming Arctic, driven by recent increases in global surface air temperature, is causing permafrost thaw, with significant implications [1]. Of particular concern is the release of mercury (Hg) previously trapped in permafrost, posing risks to ecosystems and human health [2][3]. Methylmercury (MMHg), the most toxic form of Hg, can bioaccumulate in aquatic organisms, threatening wildlife and human populations [4]. MMHg biomagnifies, with large predatory fish accumulating higher mercury levels from eating many smaller fish that have acquired mercury through plankton ingestion. It is therefore crucial to understand the processes involved in Hg cycling in permafrost thaw systems, and the microorganisms' role. This study aims to fill this gap and, at the same time, to provide insights into the impacts on Arctic ecology, ecosystem services, and human health. **Methods:** The site experiences sporadic permafrost and rapid landscape erosion, leading to the formation of thaw lakes, situated in the Sasapimakwananisikw (SAS) river valley in Nunavik, Quebec, Canada. Sediment samples were collected at various depths (0-5, 5-10, 10-15 cm). DNA was extracted from selected samples, quantified and sequenced with the Illumina platform. Metagenome-assembled genomes (MAGs) were reconstructed to characterize the prokaryotic communities involved in Hg transformation. **Results:** Proteobacteria resulted as the dominant phylum. However, additional analysis is necessary to determine the abundance of microorganisms capable of Hg methylation (hgcA-positive), determining the extent of their involvement in the mercury cycle. **Conclusions:** Permafrost environments exhibit high levels of microbial diversity. Our forthcoming results will indicate whether or not these permafrost lakes possess the metabolic capability for mercury methylation. These findings provide valuable insights that could help us develop tools to address the negative impacts of increased permafrost thaw on global ecosystems.

Keywords: Mercury, Biogeochemistry, Permafrost, Arctic, Health.

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21566 | Evaluation of different methods for the extraction and quantification of Microsporidia spores

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Background & Aim: Microsporidia are a group of unicellular microorganisms of small size with an obligate intracellular life cycle. This group of organisms infects a wide range of hosts, including humans [1]. The spores of this parasite are encapsulated in whitish-like cysts, which are formed in the walls of the skeletal muscle of the target host. The main focus of this project was to test a simple and more efficient method for the extraction and quantification of microsporidian spores. **Methods:** Three different methods were tested. In all three methods, 10 cysts were removed from the compressed muscle of the pouting (*Trisopterus luscus* Linnaeus, 1758). In the first two methods, the cysts were smashed with a microscope coverslip against a microscope slide and then washed with 1% phosphate buffered saline solution (PBS) in an Eppendorf tube. In the first method, the tube was centrifuged at 2100 xg for 15 minutes, in the second method we did not use centrifugation. In the third method, the cysts were placed in an Eppendorf tube with PBS after collection, without pressing them, to which 0.4% trypsin was added and then incubated at 37 °C for 30 minutes. In all three cases, the samples were homogenized in a vortex and 10 µl were collected and used to quantify the number of spores using a Neubauer chamber. **Results:** In a total of 5 repetitions for each method we found 4,150±2,393 (1,000—8,000) spores in each cyst using 0.4% trypsin, while the number using the pressing method was 4,100±2,443 (1,400—7,225) spores after centrifugation and 21,000±9,121 (13,000—37,500) spores without centrifugation. **Conclusions:** These results show that the method of pressing without the centrifugation gives the best results.

Keywords: Microsporidia, Cysts, Spores, Parasite.

Acknowledgments

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in the WP7-FISH, and for research grant (Ref. 2022_105_BI_BioeconomiaAzul), and for the contract (Ref. 2022_096_IJ_BioeconomiaAzul). National funds supported this research through FCT- Foundation for Science and Technology within the scope of UIDB/04423/2020 and UIDP/04423/2020, and the FCT employment contract CEECIND/03501/2017 (<https://doi.org/10.54499/CEECIND/03501/2017/CP1420/CT0010>).

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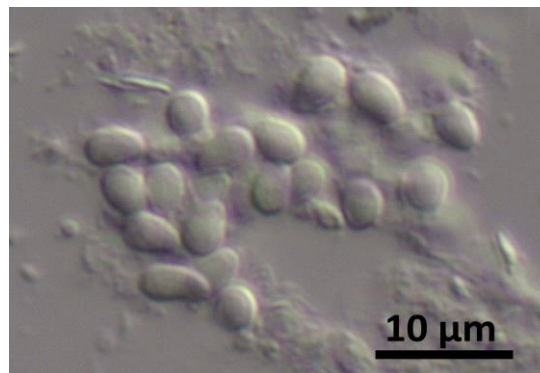


Figure 1: Free spores of microsporidia extracted from a cyst in the muscle of *Trisopterus luscus*

21571 | The Sea Between Paper: Collections of Algae in PO Herbarium at the Natural History and Science Museum of the University of Porto

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Background & Aim: The PO Herbarium at the Natural History and Science Museum of the University of Porto houses valuable collections of algae specimens, such as Isaac Newton's (one of the oldest in the northern region of Portugal) and "Flora Criptogâmica de Joaquim Sampaio", aiming to systematically arrange, digitize, and provide historical contextualization of the algae collections, enhancing their accessibility and understanding for public audiences. **Methods:** HerbScan[®] hardware and software for scanning purposes and herbarium-approved photography methods are utilized for capturing high-quality images. Comprehensive taxonomic reviews are conducted on specimens from designated collections, supplemented by historical research to contextualize the herbarium contents. Data formatting is performed using the DarwinCode format, managed in Excel. Information on select specimens is published on the In Patrimonium platform for easier access. **Results:** The systematic organization and digitization of the algae collections have been successfully initiated with specimens accurately labelled and scanned. Taxonomic reviews have provided valuable insights into the diversity and distribution of algae species within the collections. Historical research has shed light on the individuals involved in collection and preservation, enriching the understanding of the herbarium's significance. Data formatting and publication efforts have improved accessibility to the algae collections, furthering research and public engagement. **Conclusions:** This study highlights the importance of systematic management and historical documentation of algae collections within the PO Herbarium. By enhancing accessibility and understanding, this work contributes to preserve marine biodiversity knowledge and historical scientific practices. The results highlight the value of herbaria in supporting scientific research and public education initiatives, emphasizing the need for continued efforts in collection management and dissemination.

Keywords: Algae Collections, Herbarium, Digitization, Taxonomic Review, Historical Contextualization.

21604 | Challenging the health vs growth paradigm in aquaculture. A nutrition approach in Senegalese sole juveniles.

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Background & Aim: The use of functional additives in diets to improve fish condition has been thoroughly studied^{1,2}, and findings show improvements in overall growth and liver health. In Senegalese sole, there is no such clear evidence. Previous supplementation trials aimed only on easing stress using amino acids (tryptophan³⁻⁵, arginine⁶, phenylalanine⁷) and fatty acids (arachidonic acid⁸), showing also beneficial effects on liver-related metabolic processes, but with no direct validation on liver health. This project seeks to refine *Solea senegalensis* husbandry by analyzing the impact of different feeding practices on liver health. Two diets (A, a growth-oriented diet, and B, containing hepatoprotectors) will be tested at the nursery stage. While A claims better growth, it is in the company's best interest to gauge the actual gains, or lack thereof, of diet A versus diet B. The claim of improved growth may be challenged when the liver's state worsens fish health, therefore, in this study, the goal is to find a balance between growth and health. **Methods:** This study will use 100 juveniles per tank, 2 replicates of each diet, in 3 separate systems. A n=6, 1200 total fish, each weighing 3g, will be tested under a controlled RAS to ensure stable parameters and fed 4x a day, for 3 months. This experiment design may be capable of reliably emulate industrial production. **Conclusions:** To ascertain if hepatoprotection is a superior option than a diet shaped to boost growth, the histopathological status of the liver will be assessed, as well as biomolecular analysis of the liver and blood. Results are not yet available at the time of this submission; however, it is reasonable to expect encouraging preliminary results at the time of the presentation.

Keywords: *Solea Senegalensis*, Fish Nutrition, Hepatoprotectors, Functional Additives.

Acknowledgements

This work was performed at the hatchery facilities of the SEA EIGHT group (Safiestela S.A.), that provided both the systems, fish and control diet. Diet B was supplied at no additional costs by a

commercial partner. Due to non-disclosure agreements, diet contents and manufacturers will not be disclosed.

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21616 | Synthetic cannabinoid THJ-2201 dysregulates osteogenesis-related mechanisms in MC3T3-E1 cells

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Background & Aim: Synthetic cannabinoids (SCs) are new psychoactive substances (NPS) that mimic the pharmacological activity of phytocannabinoids such as tetrahydrocannabinol (THC), though with higher potency. These substances target the endocannabinoid system, which regulates a variety of biological processes, including bone remodeling. However, their impact on bone tissue dynamics remains mostly unknown. Here, we hypothesize that SCs may interfere with osteogenesis after evaluating the effects of THJ-2201 (THJ), a SC widely found in seizures and intoxication reports, on in vitro osteogenesis-related pathways at in vivo relevant doses.

Methods: MC3T3-E1 mouse pre-osteoblasts were exposed to THJ-2201, at three biologically relevant concentrations (1 pM, 1 nM, and 1 μ M) during the cells' differentiation into osteoblasts (induced with 50 μ M ascorbic acid and 20 mM β -glycerophosphate) for 14 days. A colorimetric assay was used to quantify alkaline phosphatase (ALP) activity, an early marker of osteoblast development, at 7, 10, and 14 days. Vehicle (0.1% DMSO) and positive (300 μ M naproxen) controls were also tested. THJ-2201's effect on MC3T3-E1 cell proliferation was assessed up to 72 hours using sulforhodamine B (SRB) staining. **Results:** The two higher THJ concentrations tested (1nM and 1 μ M) reduced proliferation of MC3T3-E1 cells, compared to the vehicle control in about 28% and 37 % at 48h, and 6% and 16% at 72h, respectively. However, none of the concentrations tested noticeably altered ALP activity, suggesting THJ did not interfere with osteoblast differentiation. **Conclusions:** Our preliminary data suggest that THJ may interfere with osteogenesis, emphasizing the need to further understand the toxicological effects of these substances on bone tissue dynamics.

Keywords: Substances of Abuse, Endocannabinoid System, Bone Remodelling, MC3T3-E1 Cell Line, Bone Disorders.

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21634 | Nematoda parasites from pouting (*Trisopterus luscus*) off the Portuguese coast

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Background & Aim: Nematode parasites from pouting (*Trisopterus luscus*), particularly those of zoonotic interest, such as Anisakids, will be investigated in fishes off the Portuguese coast. Sixty poutings from two seasons, autumn 2023 and winter 2024, will be analysed and compared, taking into account the host morphometric parameters and environmental conditions. The primary objective is to examine food fish safety when fish are consumed raw or undercooked.

Methods: A parasitological survey will include muscle analysis using the UV-press method and a detailed examination of the body cavity and viscera for larval and/or adult forms of Nematoda [1-5]. The worms found will be identified using morphological and molecular methods. Statistical analyzes will be carried out considering the host's total weight and length, and parameters describing infection, such as the prevalence and abundance of parasites. **Results:** The results presented in this abstract are still partial, for n= 22. The analyzed fishes had an average total length of 27.0±2.2 (24.0-32.5) cm and an average total weight of 216.1±49.7 (150-362) g. More female (86%) than male (14%) fishes were analyzed. The prevalence of Nematoda infection was 95%, with a mean abundance of 19.3±44.7 (1-213), but out of the total 424 Nematoda detected, only 12.5% (53 worms) were Anisakids. The latter had a prevalence of 68% and a mean abundance of 2.4±3.7 (0-16). No correlation was found between host data (total weight and total length) and nematode abundance. **Conclusions:** The results obtained may be influenced by an analysis conducted on a small number of pouting samples. However, we can conclude that pouting has a very high prevalence of Nematoda, and their abundance seems independent of the host's length and weight. Furthermore, the occurrence of Anisakids in this species appears to be low.

Keywords: *Trisopterus Luscus*, Zoonotic Parasites, Nematoda, Food Safety.

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Figure 1. *Anisakis* sp. worm from pouting (*Trisopterus luscus*).

21667 | *Pieris brassicae* host plant choice and acceptance on *Brassica nigra* following induction by *Orius laevigatus*

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Background & Aim: Given continuous increases in food production worldwide, pesticide use is a growing environmental concern, highlighting the need to develop alternative pest control mechanisms, such as biological control [1][2][3][4]. Omnivores are a promising biocontrol agent because they feed on herbivore pests. Besides direct predation, there is some evidence that plant feeding by these animals may aid plants in defending themselves by inducing plant defences [5][6][7][8][9][10]. This study investigates the potential of *Orius laevigatus* – an omnivore with the potential to induce responses in plants – to reduce plant choice and plant acceptance of *Pieris brassicae* – a butterfly that poses a threat to cabbage production – by its feeding on *Brassica nigra* plants. **Methods:** In this study, the plant choice (where the butterfly first landed) and acceptance (oviposition behaviour) of *P. brassicae* were assessed after exposing a butterfly to two different plants, at the same time in the same cage: one previously induced by ten individuals of *O. laevigatus* and one clean plant (without omnivores). Omnivore feeding response by the plant (induction score) was registered. **Results:** First landing preference, the number of eggs per plant and the number of clutches per plant were found to not differ significantly between treatments. Moreover, the number of eggs per clutch (clutch size) was found to be significantly lower in the induced plants: butterflies laid smaller clutches on induced plants. The number of eggs per plant was found to be significantly negatively correlated to the induction score within the induced treatment population. **Conclusions:** In summary, this study found no evidence in support of differences by treatment for plant choice and partial evidence in support of plant acceptance, toward favouring non-induced plants. Further research may offer a better perspective on the effect of omnivore induction for the species involved.

Keywords: Biocontrol, Omnivores, Double Action.

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21676 | Growth to the adult stage of phoretic mites of the red palm weevil under laboratory conditions for taxonomic studies

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Background & Aim: The red palm weevil (RPW) *Rhynchophorus ferrugineus* (Olivier, 1790) is an invasive species native to Southeast Asia ^[1]. Many mite species in their deutonymph stage have been documented to form phoretic associations with RPW ^[2], attaching themselves to the weevil in high numbers for dissemination ^[3]. The study of RPW-associated phoretic mites can help to develop potential biological control measures against this palm pest. Since mite taxonomy requires specimens in the adult stage, this project aims to create laboratory conditions to the deutonymph-adult transition and to conduct their identification through morphological and molecular analyses. **Methods:** Adult RPW were captured in the field near palm trees using pheromone traps. The weevils were transported to the laboratory in a plastic box containing apple slices. At the laboratory, the weevils underwent a brief period of cold anesthesia by being placed in a refrigerator for a few minutes before dissection for the collection of mites. Mites in deutonymph stage were placed in Petri dishes with apple slices for rearing and incubated at 28°C with 80% humidity to facilitate their transition to the adult stage. Adult mites were grouped based on their shared characteristics. Selected samples from the different groups of mite species were chosen for morphological examination under the microscope and for COI amplification by PCR. **Results:** Following 10 days within the incubator, numerous mites transitioned from the deutonymph to the adult stage using the new diet of apple slices. Initial observations have identified adults of *Centrouropoda* sp. and *Acarus* sp., with their description and identification currently in progress, alongside the amplification of the COI barcode. **Conclusions:** Through this project, we have demonstrated the feasibility of transitioning deutonymph mites to the adult stage, using a new diet, which will enable the identification of mites associated with RPW in Portugal.

Keywords: Weevil, Adult Mite, Deutonymph, Mites, *Rhynchophorus Ferrugineus*.

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Figure 1: Male adult mite specimen of the Uropodina suborder.

21687 | Volatile chemical characterization of electronic cigarettes, heated tobacco products and traditional tobacco

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Background & Aim: Tobacco smoking remains the top cause of preventable death and disease. Given its prevalence, some non-traditional alternatives have appeared, namely electronic cigarettes (ECs) and heated tobacco products (HTPs). The lack of information on the chemical composition of these products poses a challenge for toxicological evaluation, which is a gateway for investigating the potential health effects of ECs and HTPs. The present work aimed at comparing the volatile chemical composition of ECs, HTPs and traditional tobacco products (TTPs) in their native state. **Methods:** The volatile compounds of three brands of ECs, HTPs and TTPs were extracted in triplicate using two different extraction methods, namely headspace solid-phase microextraction (HS-SPME) and liquid extraction (dichloromethane). The HS-SPME and dichloromethane extracts were analysed by gas chromatography-mass spectrometry (GC-MS). Compounds were identified using a mass spectral library and standard compounds. **Results:** A total of 114 compounds were identified by the HS-SPME-GC-MS method and 108 by dichloromethane extraction (27 compounds in common). These compounds included alcohols, aldehydes, esters, ketones, pyridines, and others. Only nine compounds were found in common between ECs, HTPs and TPPs. A lower number of compounds was identified in EC samples, but these cigarettes were characterized by a high number of esters, lactones and pyranones. HTPs and TTPs have a higher number of compounds in common than ECs with HTPs and ECs with TTPs. In addition, the volatile composition of HTPs and TTPs was more homogenous between different brands, whereas the different brands of ECs were heterogenous. **Conclusions:** HTPs have a similar volatile chemical composition to TTPs in their native state which may lead to similar toxicological effects. ECs display unique compounds among different brands, with chemical classes that could be of particular interest in toxicological research.

Keywords: Electronic Cigarettes (EC), Heated Tobacco Products (HTP), Traditional Tobacco Products (TTP), Gas Chromatography – Mass Spectrometry (GC-MS), Volatile Compounds.

Acknowledgements

This work was funded by national funds from FCT-Fundação para a Ciência e a Tecnologia, I.P., in the scope of the Research Unit on Applied Molecular Biosciences–UCIBIO (projects UIDP/04378/2020 and UIDB/ 04378/2020), and the Associate Laboratory Institute for Health and Bioeconomy–i4HB (project LA/P/0140/2020). The *Cooperativa de Ensino Superior Politécnico e Universitário* (CESPU) is gratefully acknowledged for the PhD grant no. (BD/DCB/CESPU/02/2023) to Vânia Monteiro.

21695 | Deciphering Nocuolin A Biosynthesis

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Background & Aim: Cyanobacteria are well-known sources of bioactive natural products whose biosynthesis often relies on highly specific enzymes that catalyze otherwise inaccessible reactions [1, 2]. One such example is the antitumoural nocuolin A (Fig. 1), produced by the *noc* Biosynthetic Gene Cluster (BGC) [3-5]. Its C₁₃ chain originates from the condensation of hexanoic and octanoic acids performed by the enzymes NocH and NocG, and its 3-hydroxypropanoyl moiety is derived from L-methionine [5]. Furthermore, our experimental evidence indicates that NocE is a monooxygenase that hydroxylates an unactivated aliphatic carbon on a ketone intermediate and that NocF, an enzyme composed of a kinase and an aminotransferase domain, converts that ketone into an imine group, both unprecedented enzymatic activities. Hence, this work aims to further investigate nocuolin A biosynthesis through the characterization of these two enzymes. **Methods:** We started by cloning NocE and both domains of NocF separately. We transformed the heterologous host *E. coli* and then evaluated and optimized soluble protein expression before purifying the enzymes. After that, we performed *in vitro* enzymatic assays and analyzed their products using Liquid Chromatography coupled to Mass Spectrometry (LC-MS). Finally, our group is also trying to express the entire *noc* BGC in the heterologous cyanobacteria *Anabaena* sp. PCC 7120 in order to generate mutant strains lacking specific enzymes. **Results:** Our preliminary results indicate that the second domain of NocF, the aminotransferase itself, is capable of performing the transamination reaction in the absence of the kinase domain. It might also directly produce the imine product from the ketone, since our analysis did not detect any amine-containing product. **Conclusions:** This work might be of significance for the field of biotechnology because it has the potential to reveal hitherto uncharacterized enzymatic activities from cyanobacteria.

Keywords: Biosynthesis, Cyanobacteria, Liquid Chromatography-Mass Spectrometry, Nocuolin A, Secondary Metabolism.

Acknowledgments

This project falls within the scope of the ERC Consolidator Grant “GreasedLightning” awarded to Doctor Pedro Leão (supervisor).

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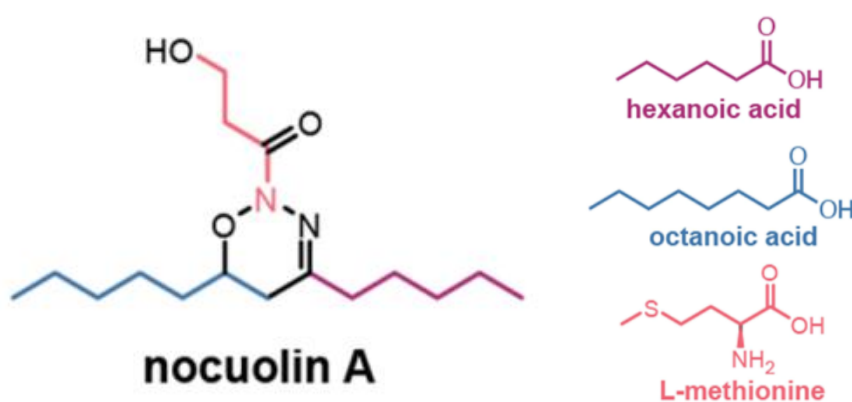


Figure 1. Nocuolin A and its main precursors. The color code indicates the origin of each atom.

21704 | *In vitro* evaluation of the regenerative potential of β 3gnt7 in spinal cord injury

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Spinal cord injury (SCI) stands as a significant medical challenge. The disruption of the intricate network of axons occurring after SCI impairs both motor and sensory signaling below the injury site. Scarring at the injury site and neuron's incapacity to re-engage in growth programs results in abortive regeneration [1]. An exception to this rule is the spiny mouse, *Acomys cahirinus*, which shows sustained scar-free regeneration of the skin [2], ear [3] [4], kidney [5], heart [6] and muscle [7]. It was recently discovered by our group and others that *Acomys* not only shows reduced spinal inflammation and fibrosis after dorsal hemi-crush injury of the spinal cord [8], but it is also able to spontaneously recover motor and urinary function after complete SCI [9]. This is possible due to the pro-regenerative environment assembled with rewired glycosyltransferase activity at the injury site, in which β 3gnt7, a crucial enzyme in KSPG biosynthesis, was demonstrated as a potent enhancer of axon growth [9]. Following our findings, we aim now to uncover the molecular and cellular response induced by β 3gnt7, and its regenerative potential. Simulating SCI *in vitro*, we observed that, in the presence of β 3gnt7-expressing cells, *Mus* cortical neurons regenerate longer axons after axotomy, when compared to those regenerating in the presence of GFP-expressing cells. To further study the mechanisms triggered by β 3gnt7 within the neurons, we are currently performing RNA sequencing of neurons grown on top of β 3gnt7-expressing cells. Furthermore, using cell-specific markers, we observed that β 3gnt7 mRNA is expressed in a subset of oligodendrocytes in the *Acomys* lesion site after SCI. Together, these results support that β 3gnt7 is not only a neuronal growth enhancer but also a potential pro-regenerative agent, expressed by oligodendrocytes. In the future, using the knowledge that we are gathering, β 3gnt7 will be explored as a target for new therapies to enhance axon regeneration after SCI in non-regenerative mammals.

Keywords: Spinal Cord Injury (SCI), Central Nervous System (CNS), *Acomys Cahirinus*, B3gnt7, KSPG Pathway.

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21722 | Exploring Actinobacterial Diversity in *Ruta graveolens*: Phylogenetic

Identification and Bioactive Potential Investigation

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Background & Aim: Medicinal plants and their components have been utilized in traditional medicine for centuries and have significantly influenced the development of modern medicine [1]. *Ruta graveolens*, a Rutaceae medical plant, is known for its antibacterial, anti-inflammatory and cytotoxic properties [2]. Actinobacteria are a rich source of compounds exhibiting diverse biological activities and potential therapeutic applications [3]. The aim of this study was to perform the phylogenetic identification of a collection of actinobacterial strains previously isolated from *R. graveolens* and to investigate their bioactive potential. **Methods:** Actinobacterial strains previously isolated from stem, roots and leaves of *R. graveolens* were grown in Actinomycete Isolation Agar (AIA) or Starch-Casein-Nitrate-Agar (SCN). DNA from grown cultures was extracted and phylogenetically identified through 16S rRNA gene sequencing. For each strain, organic extracts were performed and used for the screening of antimicrobial activity, using the disk diffusion test, against four reference bacteria (*Staphylococcus aureus*, *Bacillus subtilis*, *Salmonella typhimurium*, *Escherichia coli*) and one yeast (*Candida albicans*). **Results:** Thirty-two actinobacterial isolates were so far identified. Most of the strains was identified as *Tsukamurella tyrosinosolvans*, constituting 13 out of 32 isolates, followed by 8 *Streptomyces sp.*, 7 *Brevibacterium sediminis*, 3 *Microbacterium ginsengiterrae*, and one *Gordonia hydrophobica*. The organic extracts obtained from each isolate were tested for their antimicrobial activity. Up to moment, no significant bioactivity was detected in the reference strains screened in this study. **Conclusions:** A collection of 32 actinobacterial strains was obtained from various parts of the medicinal plant *R. graveolens*. Though no relevant antimicrobial activity was yet found, extracts of these actinobacteria open new opportunities to explore their bioactive potentials with therapeutic applications.

Keywords: Actinobacteria, Medicinal Plant, Bioactivity, *Ruta Graveolens*, Endophytes.

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21742 | Evaluation of the role of HMGA1 protein in colon cancer stem cells

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Background & Aim: The incidence of colorectal cancer (CRC) is rising in highly developed nations. Cancer stem cells (CSCs) are linked to tumour initiation and chemotherapy resistance. HMGA1 protein, which is often overexpressed in cancer, exerts its effect on gene expression by inducing chromatin changes. It is pivotal in maintaining a stem cell phenotype, with its expression linked to SOX2, OCT4, and C-MYC transcription factors (TFs). In gastric cancer, HMGA1 exerts a positive regulatory effect on C-MYC, thereby promoting glycolysis [1]. The aim of this study was to assess the functional relevance of HMGA1 in colon CSCs. **Methods:** We first evaluated HMGA1 levels in 219 stage II CRC samples, by immunohistochemistry, and its correlation with clinicopathological/molecular data. We next transduced a colon cancer cell line, HCT116, with the lentiviral SORE6 reporter vector [2], that enables detection of CSCs by using a green fluorescent protein (GFP) driven by a promoter with binding sites for SOX2 and OCT4. We later isolated two cell subpopulations, SORE6+ and SORE6-, by Fluorescence Activated Cell Sorting (FACS), that were transduced with a DOX-inducible lentiviral expression vector for HMGA1, to assess its role in the acquisition of stemness characteristics in colon CSCs. Flow cytometry (to measure GFP), Western blot and real-time PCR (to see TFs expression) and functional assays (clonogenic/5-FU resistance) were performed. **Results:** Tumours with high HMGA1 were significantly associated with MMR-proficiency and SOX2. SORE6+ cells (CSC-like), had higher SOX2 expression than SORE6- (non-CSCs), as expected, but less HMGA1. We observed a GFP gain, but only in SORE6+ HMGA1 transduced cells. Regarding TFs expression, while SOX2 appeared to be inhibited, C-MYC was up-regulated by HMGA1. No differences were observed in functional assays upon transduction with HMGA1. **Conclusions:** Overall, no discernible role for HMGA1 has been demonstrated in this CSCs model, despite the observed positive regulation of C-MYC.

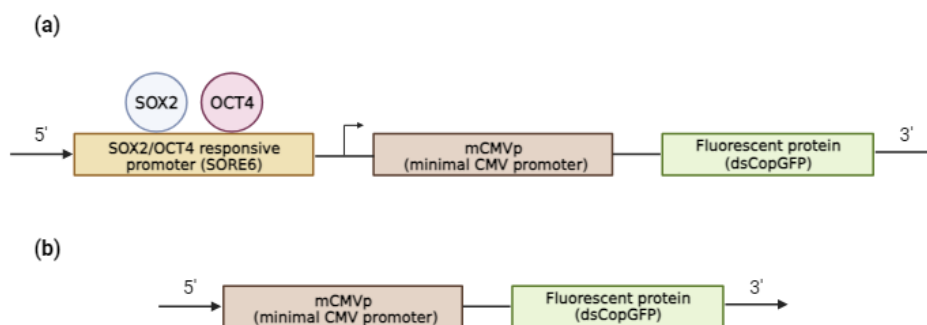
Keywords: Colorectal Cancer, Cancer Stem Cells, HMGA1, SORE6, C-MYC.

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Figure 1: HCT116 cells were transduced with (a) the SORE6 reporter vector or (b) the empty vector.

21746 | A Functional Study on the Ybbr Domains of the CdaR protein

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Background & Aim: Cyclic di-AMP (c-di-AMP) is a second messenger found in several bacteria that, among other functions, affects osmoregulation in the cell [1]. A diadenylate cyclase (DAC) featuring a DAC domain is responsible for the synthesis of this dinucleotide from two molecules of ATP. While several classes of DACs exist, the most prevalent in bacteria is CdaA [2]. This protein is commonly found in an operon also featuring the proteins CdaR and GlmM, both known regulators of CdaA [3]. While GlmM has previously been found to inhibit CdaA activity, CdaR's function is still unknown. By studying the Ybbr domains found in this protein, this project has the intention to better understand CdaR's activity. **Methods:** A total of four *Bacillus subtilis* CdaR mutants featuring different numbers of Ybbr domains will be obtained and inserted into either Nanodiscs or Liposomes. The reconstituted Nanodiscs will be used in HPLC activity assays that will measure c-di-AMP and ATP levels, inferring from that the effect of CdaR on CdaA activity. In addition, the CdaA-CdaR complexes will also be inserted into Liposomes in solutions of different pHs and used in HPLC assays. **Results:** Preliminary results reveal similar c-di-AMP production values for each of the CdaA-CdaR complexes featuring the CdaR mutants. The number of Ybbr domains seems to also not affect GlmM's inhibition of CdaA. Further experiments will be made to corroborate these results and to ascertain if pH has an effect on CdaR and thereby influences the activity of CdaA. **Conclusions:** This project aims to better understand the role and function of the Ybbr domains and the CdaR protein in the production of c-di-AMP, contributing to the overall knowledge of this process in *B. subtilis*.

Keywords: c-di-AMP, Bacillus Subtilis, CdaA, CdaR, Ybbr Domains.

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21757 | Loss of Vps27-dependent iron homeostasis is not associated with the shortened lifespan of *sit4Δvps27Δ* yeast cells

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Background & Aim: *Saccharomyces cerevisiae* cells lacking Sit4, a PP2A-like protein phosphatase, display an increase in chronological lifespan (CLS), through vacuolar acidification, mitochondrial derepression and promotion of oxidative stress resistance. A proteomic analysis (unpublished) revealed that vacuolar membranes of *sit4Δ* cells were enriched in Vps27. In addition, *sit4Δvps27Δ* cells exhibited a shortened CLS, in comparison with the single mutants. The analysis of *sit4Δ* vacuolar membranes also showed an alteration in proteins related to iron homeostasis. Vps27 is known to control vesicle sorting of iron transporters for degradation in vacuoles. Hence, this work aimed to decipher the role of Vps27 in the regulation of iron homeostasis and CLS of cells lacking Sit4. **Methods:** *S. cerevisiae* cells (wildtype, *sit4Δ*, *vps27Δ* and *sit4Δvps27Δ* strains) were grown to late exponential (LOG) and post-diauxic shift (PDS) phases and iron levels were measured using a colorimetric assay [1]. Iron sensitivity was studied via spot assays in synthetic complete media supplemented with increasing iron (II) concentrations. To assess the effect of iron chelation on H₂O₂ stress resistance and CLS, yeast cells were grown in media supplemented with bathophenanthroline disulfonate (BPS). Experiments were done in triplicate and statistical analysis was performed using one-way ANOVA. **Results:** The *sit4Δvps27Δ* double mutant cells displayed higher levels of iron at PDS phase and increased sensitivity to iron supplementation, in comparison to the wildtype and the *sit4Δ* or *vps27Δ* single mutants. However, *sit4Δvps27Δ* cells were not more sensitive to H₂O₂ and iron limitation with BPS had a minor effect on the CLS of *sit4Δvps27Δ* cells. **Conclusions:** *VPS27* deletion in *sit4Δ* cells culminates in the loss of iron homeostasis. Nevertheless, iron accumulation does not seem to be involved in the premature aging of *sit4Δvps27Δ* cells.

Keywords: Sit4, Vps27, Iron, Chronological Lifespan, Vacuole.

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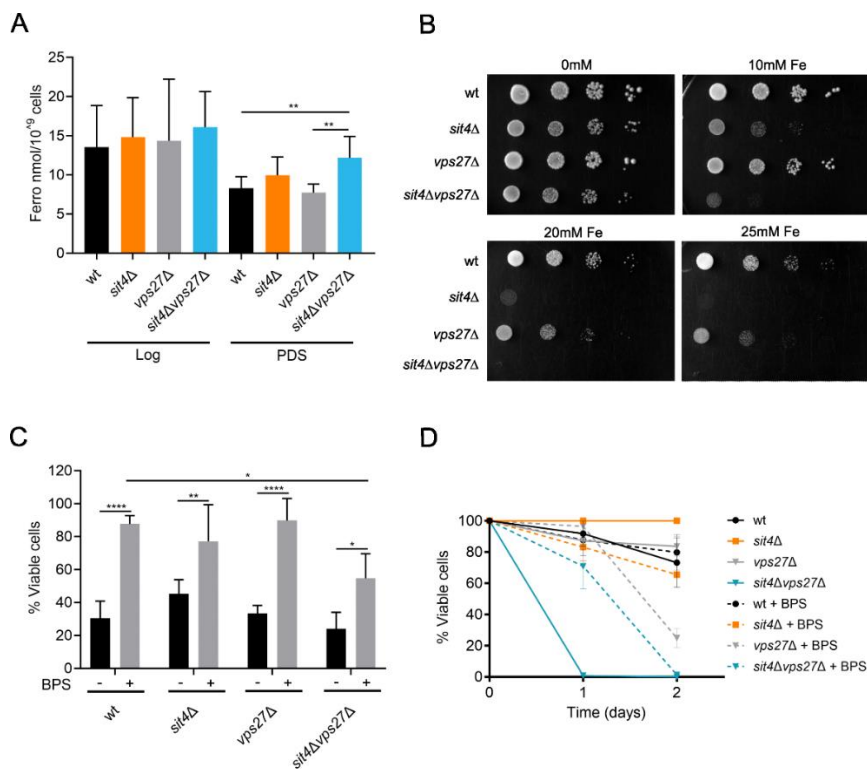


Figure 1: Iron levels and the effect of iron chelation on oxidative stress resistance and lifespan in *sit4Δvps27Δ* cells.

21764 | Antarctica's Dry Valleys as a planetary analog for Mars – implications for potential life forms

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Background & Aim: Extremophiles offer crucial insights into the survival mechanisms required for life to adapt to extreme environments on Earth and potentially in other places in our solar system [1]. The McMurdo Dry Valleys in Antarctica [2] are used as a planetary field analogue, i.e., a terrestrial environment that share some features with those found on other planetary bodies. In particular, they mimic some conditions of permafrost on Mars, due to its extreme cold and arid nature [3]. Studying extremophiles found on the McMurdo Dry Valleys will provide insights into the optimum growth conditions and metabolic adaptations if they exist on Mars. The objective of this work is to investigate the mineralogical similarities between the regolith of the Dry Valleys and Mars, and to study the adaptive growth patterns and metabolic alterations of microorganisms from a planetary field analogue of Mars. **Methods:** To identify mineralogical similarities of the Antarctic Dry Valleys with the Martian regolith, X-ray diffraction (XRD) analysis of Dry Valleys soil samples was performed. Ongoing research involves growth experiments of microorganisms isolated from the Dry Valleys, to identify strains that adapt to conditions mineralogically similar to Mars. Finally, gene expression analysis will be performed, to evaluate the metabolic adaptations. **Preliminary Results:** Stereomicroscopy and XRD analyses unveiled the existence of monomineral or lithic soils within samples collected from the Dry Valleys. The investigation further involved the examination of both magnetic and non-magnetic fractions, leading to the identification of minerals, namely magnetite. **Discussion:** Nanocrystals of magnetite can be found in Mars [4], [5]. The characterization of Dry Valleys soil samples enhance our understanding of the geological composition of the Antarctic Dry Valleys environment and lay the groundwork for further studies into the possible influence of magnetite of the Martian regolith on potential life forms.

Keywords: Extremophiles, Mars analogue, Antarctic Dry Valleys, Astrobiology.

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21765 | Activity budget of Humboldt penguins (*Spheniscus humboldti*) under human care at SEA LIFE Porto and how Environmental Enrichment may influence activity levels

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Background & Aim: Humboldt penguins (*Spheniscus humboldti*) are categorized as "vulnerable" on the International Union for Conservation of Nature's (IUCN) Red List, mostly due to human activities. Keeping animals under human care is one approach for contributing to species conservation, prioritizing both their emotional and physical well-being. Introducing environmental enrichment (EE) is an initial step towards this goal. This study aimed to identify which EE devices would help improve walking, exploratory, and swimming-related behaviors of Humboldt penguins at SEA LIFE Porto, with the added goals of extending their swimming time and expanding the display area they actively use, thereby contributing to the overall welfare of the animals. **Methods:** Over 17 days, eight penguins at SEA LIFE Porto were observed *ad libitum* to create an ethogram unique to this group. After excluding videos with poor visibility circumstances, 28 systematically recorded videos were analyzed using The Observer XT 11.5 software. Recordings were made at 11 AM and 3 PM, both either with and without the presence of EE. Every minute, an instantaneous scan sample was made, for a total of 15 scans per video. The identified behaviors were then classified into 12 categories related to maintenance, locomotion on land and water, social interactions, stationary activities, and agonistic behaviors. **Results:** Comparison of the data before and after EE introduction showed promising preliminary results. EE implementation led to improvements in swimming, locomotion on land, social and agonistic behaviors, and a reduction in stationary and maintenance behaviors. **Conclusions:** Even though more replications are needed to draw robust conclusions, initial findings suggest that EE positively influences the penguin's behavior, promoting increased activity and socialization. Future research will focus on understanding if this trend continues and assess any concerns regarding heightened agonistic behaviors.

Keywords: *Spheniscus Humboldtii*, Environmental Enrichment, Activity.

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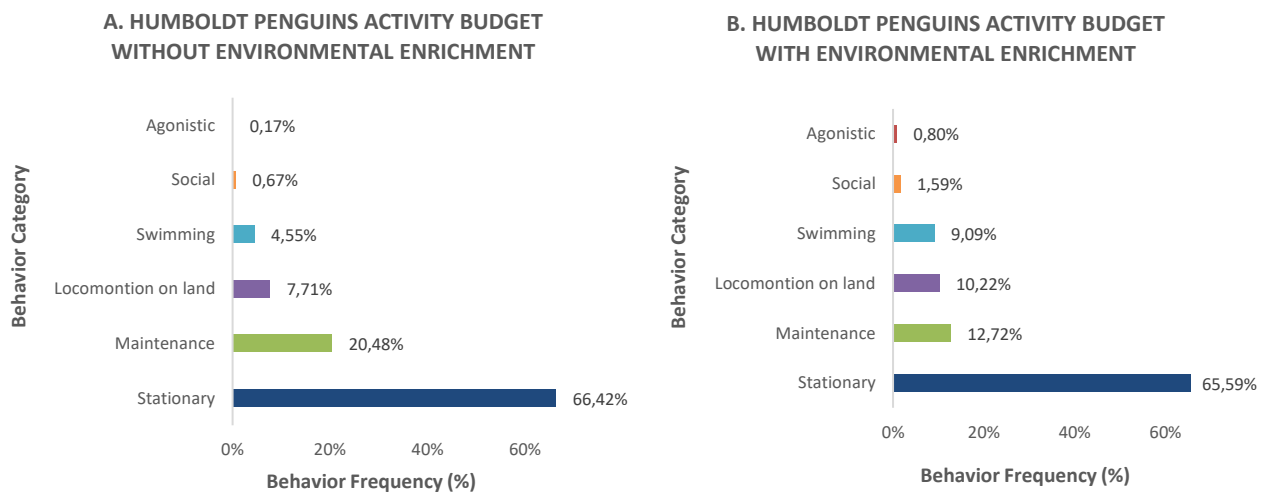


Figure 1: SEA LIFE’s Humboldt penguins' (*Spheniscus humboldti*) activity levels without (A) and with (B) environmental enrichment. Environmental enrichment implementation increased swimming, locomotion, and social and agonistic behaviors/interactions by approximately 5, 3 and 1 percentage points, respectively. Stationary and maintenance-related behaviors decreased by 1 and 8 percentage points.

21773 | Cestoda parasites of the pouting (*Trisopterus luscus* (Linnaeus, 1758)) off the Portuguese waters

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Background & Aim: Fish is an important source of protein and omega-3 in our daily diet. However, it must be consumed free of zoonotic parasites that could eventually infect humans [1]. These parasitic diseases can be caused by a wide variety of organisms, particularly nematodes, cestodes and trematodes. Therefore, the objective of this project is to study the degree of parasitic infection of the pouting by cestodes, a group of potentially zoonotic parasites, and verify the extent to which the pouting consumption does not represent a risk to public health. **Methods:** The poutings were collected in Lota de Matosinhos/Porto, during 2023. In order to detect worms, we carried out a parasitological survey, and the cestodes found were collected, counted and stored in 70% ethanol. The infection levels considered in our study were the ecological parameters: prevalence (P, in %), total intensity (TI), mean intensity (MI), mean abundance (MA) and mean density (MD), were applied according to Bush et al. [2] The food health risk generated by cestodes took into account their identification and the infection levels detected. **Results:** Sixteen poutings were analyzed and recorded an average total weight of 189.6±54.1 (111-281) g, and an average length of 26.1±2.5 (21.0-29.5) cm. The pleurocercoids found in this work parasitizing the poutings belong to the order Trypanorhyncha Diesing, 1863 and the genus *Nybelinia* Poche, 1926. The worms were found free in the muscles surrounding the pharynx, in the gills, and in the mesentery around the host's viscera. The parasitic indices for specimens of *Nybelinia* sp. found were: P=81.3%; IT=766; MI=58.9±118.4 (1-348); MA=47.9±108.5 (0-348) and MD=0.18±0.39 (0-1.27). **Conclusions:** The poutings are parasitized by *Nybelinia* sp., with a high occurrence. However, more in-depth research must be carried out to confirm the identification of the species and the risk to human health of these cestodes found in pouting.

Keywords: Cestoda, Pouting, Zoonotic Parasites, *Trisopterus Luscus*.

Acknowledgements

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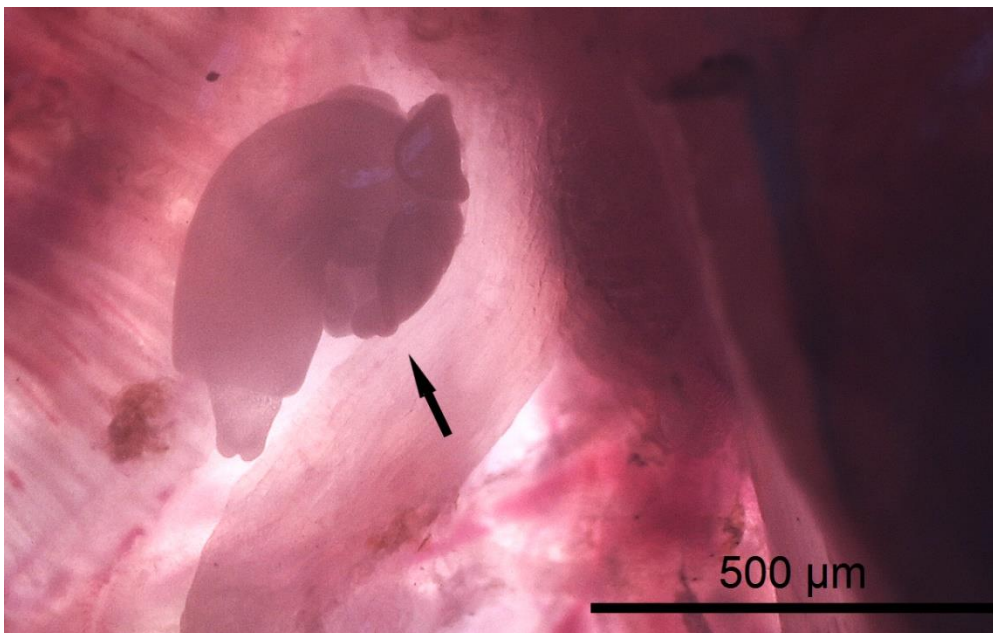


Figure 1: *Nybelinia* sp. free in the muscles of pouting (*Trisopterus luscus*) captured in Portuguese waters

21775 | Improving the production of the heterologous compatible solute glycine betaine in *Synechocystis*-based chassis

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Background & Aim: Organisms can cope with salinity and temperature fluctuations through the production of compatible solutes. Glycine betaine is one of these solutes that is able not only to enhance halotolerance but also has numerous applications in nutrition, pharmaceutical and cosmetics products. Currently, glycine betaine is extracted from sugar beets or chemically synthesized, resulting in low yields and in a higher environmental impact, respectively. Thus, new and more sustainable production ways are needed. For the model cyanobacterium *Synechocystis* sp. PCC 6803, both molecular and synthetic biology tools, and genome-scale metabolic models are available. This, together with its photoautotrophic metabolism and metabolic plasticity allows its use as a solar-powered cell factory. Previously, several mutants have been generated by the research team hosting this project, such as $\Delta ggpS$, which lacks the native compatible solute glucosylglycerol, and the $\Delta ggpS:Ahbet$ mutant, which has $\Delta ggpS$ background and a synthetic device enabling the heterologous production of glycine betaine [1]. This study aims at increasing the availability of the precursor, glycine, by (i) supplementing the growth medium and (ii) through the generation of the $\Delta gcvT$ mutant, deficient in one of the proteins in the glycine cleavage system, which increases the intracellular availability of this amino acid. **Methods:** To test the influence of glycine supplementation, $\Delta ggpS:Ahbet$ and $\Delta ggpS$ are cultivated in BG11 3% NaCl medium, without or with different glycine concentrations (3 mM, 6 mM and 9 mM). The growth is monitored (OD_{730} , chlorophyll *a*) for 16 days. The segregation of $\Delta gcvT$ mutants is being analyzed by PCR. **Expected Results & Conclusions:** The increased availability of the precursor glycine is expected to improve the production of the compatible solute glycine betaine, further confirming *Synechocystis*' potential as a photoautotrophic chassis/cell factory.

Keywords: Glycine Betaine, Synthetic Biology, *Synechocystis*, Halotolerance.

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21790 | Skin Protective effects of marine cyanobacteria

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Background & Aim: Cyanobacteria are organisms with great ability to adapt to a wide variety of ecological conditions such as temperature, pH, salinity, and radiation [1]. This adaptability is reflected in the production of secondary metabolites with biological interest. In addition, their cultivation is ecologically and economically sustainable, which makes them attractive to the cosmetics industry [1,2]. In this work, two strains of cyanobacteria from Cape Verde were screened for their potential use in skin care. **Methods:** Acetone and aqueous extracts from two strains, namely, *Nodosilineales cyanobacterium* LEGE 181191 and *Chroococcales cyanobacterium* LEGE 181151 were analyzed for total phenolic content (TPC), through Folin-Ciocalteu method; and their chemical profile was established for carotenoids, chlorophylls and phycobiliproteins (PBP). The cytotoxicity of the extracts, in keratinocytes (HaCat) cell line, was evaluated by the MTT assay. Regarding antioxidant activity, superoxide anion radical ($O_2^{\bullet-}$) and nitric oxide radical ($^{\bullet}NO$) scavenging were evaluated. Also, the potential impact on melanin production, using the tyrosinase inhibitory assay, was investigated. **Results:** Both acetone and aqueous extracts showed considerable antioxidant potential, being acetone extracts with greater activity in ($^{\bullet}NO$ sequestration and aqueous extracts showing better results in the $O_2^{\bullet-}$ scavenging. It was observed that the carotenoid content was higher in acetone extracts, while aqueous extracts had a higher amount of phycobiliproteins [2] **Conclusions:** Both *Nodosilineales cyanobacterium* LEGE 181191 and *Chroococcales cyanobacterium* LEGE 181151 extracts have shown good antioxidant potential, with a causal relationship between the chemical composition and the bioactivity observed. Thus, this work emphasizes the importance of studying cyanobacteria as a viable alternative based on natural products for the cosmetic industry.

Keywords: Antioxidant Potential, Cytotoxicity, Pigments, Cosmetics.

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21799 | Long distance relationships: genomics suggests the existence of a panmictic population in the worm pipefish

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Background & Aim: Among a myriad of other factors, both geographical distance and sexual selection have been recognized as able to play an active role in the process of divergence and speciation. Thus, when Monteiro et al. (2017) showed, for the worm pipefish, *Nerophis lumbriciformis*, that populations at both edges of the species range, separated by more than 30° of latitude, experienced higher sexual selection intensity when compared to the centre of distribution [1], a sizable degree of differentiation was hypothesised. Surprisingly, despite distance and sexual selection action, the phylogeographic analysis of Mendes et al. (2020), mainly based on mitochondrial markers, revealed no apparent population structure along the species range [2]. So, using whole genome sequencing, which allows for a considerable increase in resolution, we aim to verify if worm pipefish populations are indeed genetically homogeneous. **Methods:** Whole genomes were sequenced from individuals sampled in four populations near the edge of distribution (North: Norway and Scotland; South: Portugal and Spain). Reads were mapped to the reference genome of *N. lumbriciformis* and variants called. Using a dataset of ≈80k SNPs, we looked for population structure by computing a PCA, running an ADMIXTURE analysis, calculating heterozygosity (expected and observed) and pairwise FSTs, and looking for runs of homozygosity (ROH). **Results:** Both PCA and ADMIXTURE hinted at the existence of a single population, in line with the minute pairwise FST obtained (all <0.002). Furthermore, heterozygosity and ROH results suggest the occurrence of extensive gene flow. **Conclusions:** Our genomics approach confirmed the inexistence of any obvious population structure. Given the adult's low dispersal ability, we suggest that the observed panmictic population likely derives from the continuous dispersal of the species' pelagic larvae, probably emanating from the centre of distribution.

Keywords: *Nerophis Lumbriciformis*, Genomics, Population Structure, Syngnathidae.

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21801 | Functional characterization of a putative iodine transporter in *Arabidopsis thaliana*

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Background & Aim: Iodine is a crucial element in the human diet and its deficiency leads to health problems with serious negative effects on brain development. The use of iodized salt has helped to tackle iodine deficiency, but it is not enough and other ideas have started to be considered, such as improving crops with iodine biofortification. However, knowledge about how iodine is regulated and transported within plants is almost non-existent. This project aims to investigate the molecular mechanisms of iodine regulation through potential iodine transporters to increase iodine content, using *Arabidopsis thaliana* (*Arabidopsis*) as a model organism. **Methods:** In previous work, a comparative genomics approach with various non-plant models allowed the identification of homologous iodine transporters in plants, such as putative sodium-iodide symporters (NIS). Plant NIS orthologs were target for several *in silico* analyses, including gene expression patterns. *Arabidopsis* NIS transcript levels in response to different iodine salts were accessed by quantitative RT-PCR. In addition, techniques such as gene cloning were pursued to produce AtNIS tagged with Cyan Fluorescent Protein (CFP) overexpressing plants. The *35S::AtNIS:CFP:HA* construct was transiently transformed by agro-infiltration into *N. benthamiana* leaves to observe subcellular localization of AtNIS. **Results:** The phylogenetic study indicated that NIS orthologs exist and are conserved in plants. Furthermore, our analysis indicated that *AtNIS* expression increases during seed germination and that iodine supplementation in the media increased *AtNIS* expression. Online tools have predicted that AtNIS is localized in the plasma membrane. To corroborate this, a transient expression of *AtNIS:CFP:HA* was tested in *N. benthamiana* leaves. **Conclusion:** The NIS-like gene family is conserved in plants, and AtNIS is iodine-responsive and likely a cell membrane-localized iodine transporter.

Keywords: Iodine Homeostasis, Functional Genomics, Gene Expression.

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21817 | Development of hyaluronic acid and collagen films for wound healing

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Background & Aim: Hyaluronic acid (HA) and collagen (COL), both polymers present in the extracellular matrix, are usually used in cosmetic products. In wound healing, these components have a key role by providing structural support, facilitating cell regeneration, and promoting a moist environment leading to effective skin recovery [1,2]. However, there are still few formulations, namely patches, that combine these two polymers. The main objective of this work was to prepare, characterize and compare five different film formulations containing HA and COL, intended for wound healing. **Methods:** Initially, three films were prepared, the first containing only hydroxypropyl methylcellulose (HPMC), the second HPMC and COL and the third HPMC and HA. Subsequently, a film containing the three polymers, HPMC, HA and COL was prepared as well as a double-layer film with HPMC and HA in the first layer and HPMC and COL in the second layer. The films were produced by the solvent evaporation method. The pH and viscosity of polymer dispersions were evaluated before the solvent evaporation. Then, the extensibility, thickness, resistance to bending, mass uniformity, and moisture content of films were assessed. **Results:** All formulations had pH values between 5-7 which are compatible with the skin. HA increased the viscosity of the formulation whereas COL was found to maintain it. The moisture content, thickness and mass uniformity were similar for all films. Regarding extensibility, films containing HA had the highest values, indicating greater rigidity and resistance. However, films containing only HPMC and HPMC associated with COL had the lowest values, suggesting that COL does not contribute to the rigidity of the films. **Conclusions:** Films containing simultaneously HA and COL presented better results, with no significant differences between the one-layer and the two-layer films. HA and COL in combination have better film-forming properties.

Keywords: Collagen, Hyaluronic Acid, Films, Wound healing.

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21826 | Exploring the cosmetic potential of the filamentous cyanobacteria *Calothrix*

sp.

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Background & Aim: Cyanobacteria are one of the oldest living organisms colonizing Earth. To survive in extreme and competitive environments, these microorganisms have evolved mechanisms to combat environmental stressors, through the production of secondary metabolites of different chemical classes. Compounds with considerable antioxidant activity, such as phenols, carotenoids and phycobiliproteins, play a particularly important role in the protection of strains subjected to intense solar radiation. In this regard, there has been an increase in the biotechnological exploitation of these compounds as natural ingredients for skin protection, which faces similar challenges [1,2]. In this context, the purpose of this work was to assess the potential of extracts of different polarities obtained from a cyanobacteria strain isolated from a Portuguese marine ecosystem (*Calothrix* sp. LEGE 06100), as natural antioxidant and UV-protecting ingredients for cosmetic formulations. **Methods:** Extracts of different polarities will be prepared from the dry biomass of the filamentous cyanobacteria *Calothrix* sp. LEGE 06100, through a sequential extraction process with acetone and water. The resulting extracts will be chemically characterized for their pigments profile by HPLC-PDA, and explored for their ability to scavenge important physiologic free radicals (superoxide anion radical, $O_2^{\bullet-}$ and nitric oxide radical, $\bullet NO$) and enzymes (tyrosinase and elastase) involved in skin aging. **Results:** The chemical characterization of the aqueous extracts revealed a predominance of phycobiliproteins, whereas the acetonics ones were characterized by a predominance of β -carotene and zeaxanthin. Both extracts presented antioxidant potential, with the aqueous ones being more effective in scavenging $O_2^{\bullet-}$, and the acetonics ones presenting better results for $\bullet NO$. **Conclusions:** Both *Calothrix* sp. LEGE 06100 extracts are good candidates for the development of natural cosmetic ingredients, due to their ability to scavenge deleterious free radicals correlated with the loss of skin structure and inflammatory conditions.

Keywords: Carotenoids, Phycobiliproteins, Cosmetics, Oxidative Stress, Skin Aging.

Acknowledgments

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21832 | Effects of synthetic herbicide atrazine on bovine epididymal sperm function and structure

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Background & Aim: Atrazine (ATZ), a widely utilized synthetic herbicide globally, persists in both ground and surface water, even in areas where it has not been used for many years. As an endocrine disruptor, ATZ has been implicated in altering the reproductive function across various mammalian species. This study aims to investigate the impact of ATZ exposure on bovine sperm function and viability. Specifically, we aim to determine if bovine spermatozoa at different stages of epididymal maturation exhibit varying sensitivities to this pesticide. **Methods:** For this purpose, pairs of bovine testes (aged >12 months) were obtained from a local abattoir and stored overnight at 5°C. The epididymis was then isolated from the testis and the epididymal head, body and tail were dissected to allow spermatozoa from each compartment to be collected in falcon tubes. After sperm evaluation (subjective motility (tail) - light microscopy; concentration - Neubauer chamber; morphology and viability - eosin - nigrosine), a total of 50×10^6 sperm from each epididymal compartment were exposed to different concentrations of ATZ: 0, 0.1µM, 1µM and 10µM. Sperm incubation was performed in Tris-citrate-fructose medium at 37°C and sperm analysis (motility (tail), morphology and viability) was performed after 1 and 2 h of incubation. **Results and Discussion:** Preliminary results suggest that sperm motility (tail) and viability (in each epididymal compartment) decreased after incubation in all experimental groups, but no differences were detected between experimental groups incubated with and without ATZ for 1 h or 2 h. Similarly, no differences in sperm morphology were detected. These results suggest that other markers may be required to assess the effect of ATZ in epididymal spermatozoa. Hence, work is underway using additional markers of sperm viability and function, such as mitochondrial membrane potential (JC-1), to assess the effect of ATZ on bovine epididymal.

Keywords: Atrazine, Spermatozoa, Bovine, Toxicology.

21842 | Unveiling water mite diversity in Portugal: a prelude to species discovery

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Background & Aim: Water mite is the name given to members of the Acari class Hydrachnidia. Characterised by their aquatic life, these organisms are one of the most diverse and abundant freshwater arthropod groups, yet they are still globally understudied. In continental Portugal, there are currently 99 known species of water mite, a number that is unlikely to represent the true diversity as most records are ancient, punctual, and made by foreigners while visiting the country. This study aims to help unveil Portuguese water mite diversity by documenting specimens found in streams and ponds across the country and preparing them for DNA barcoding procedures. **Methods:** Water mites were collected on the field, stored in 96% ethanol, observed under a stereomicroscope, and grouped by morphotypes. Afterwards, for each site, a specimen from each morphotype was isolated, coded and photographed. The photographs, along with specimen and sampling metadata, were then registered on a spreadsheet and uploaded to the Barcode of Life Database (BOLD) to create a reference collection. *Finally, one water mite was placed, per well, in 96-well plates with 30µl ethanol 96% and sent for DNA barcoding.* **Results:** 190 specimens belonging to 98 morphotypes were isolated to be DNA barcoded and were registered on BOLD, along with their metadata and 376 photographs from those same specimens. Samples came from 25 sites sampled across continental Portugal. Two 96-well plates with water mites were sent for DNA barcoding. **Conclusions:** 190 specimens belonging to 98 morphotypes were isolated and sent for DNA barcoding, making them available for follow up studies on their taxonomy and potentially for new species discovery.

Keywords: Hydrachnidia, Biodiversity, Freshwater, Sampling, Portugal.

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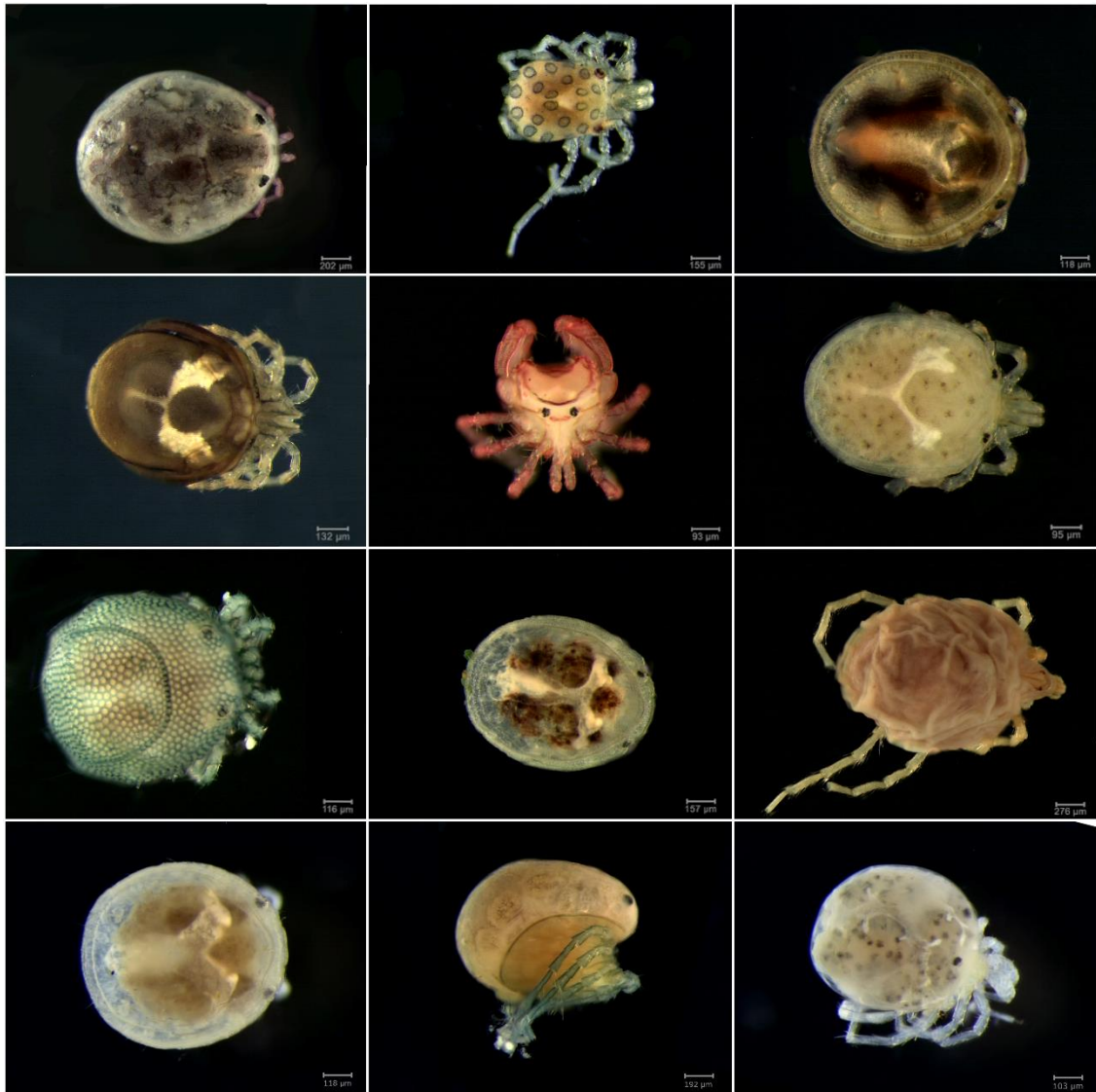


Figure 1: Examples of the diversity of water mites found in Portugal.

21852 | Evaluation of the anticancer potential of the macrofungus *Pisolithus arhizus* mycelium and culture medium

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Background & Aim: Macrofungi produce remarkable biomedical products that can make a significant contribution to health. *Pisolithus arhizus* is a fungal species of the phylum *Basidiomycota*. It is mainly found in association with the roots of some trees species, establishing a mutualistic relationship with them, facilitating the absorption of nutrients from the soil in exchange for carbohydrates produced by the host plant. As recently reviewed by us [1], this macrofungus has aroused great interest due to its promising therapeutic properties and bioactive effects. **Methods:** Crude extracts were prepared from the mycelium and culture medium of *P.arhizus* using a mixture of dichloromethane:methanol (2:1. The extracts were then separated into nine fractions using vacuum liquid chromatography. The fractions were tested for cytotoxicity against the RKO colon adenocarcinoma cell line and 3T3 fibroblasts cell line. Cell viability was assessed using the 3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) reduction assay. **Results:** Preliminary results revealed a dose dependent cytotoxicity against RKO cell line with no significant cytotoxicity to 3T3 cell lines, in fractions B and C. Those fractions corresponded to extraction with 70% Hex:30% EtOAc and 60% Hex:40% EtOAc, respectively. **Conclusions:** The results indicate that *P.arhizus* mycelium is a source of compounds with anticancer activity. However, more in-depth studies are needed to analyze the chemical compounds from the various parts of *P. arhizus* and investigate their biological and toxicological activities. Exploring the bioactive potential of *P. arhizus* is key to developing a complete understanding of its therapeutic benefits.

Keywords: *Pisolithus Arhizus*, Macrofungi, Anticancer Potential.

Acknowledgments

The authors are grateful to FCT financial support to CIIMAR (UIDB/04423/2020 and UIDP/04423/2020).

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21857 | Exploring hybridization dynamics in Alpine Hare Species under climate-driven range shifts

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Background & Aim: Anthropogenic-driven environmental changes pose a significant threat to biodiversity, impacting both species dynamics and ecosystems [1]. The Alpine ecosystems are among the most vulnerable regions to these phenomena, with continuous increase in temperature and decrease in snow cover during winter in recent decades [2]. These changes have important impacts on the distribution and survival of species adapted to the high mountain habitats and cause the invasion of their range by temperate species [3,4]. When the species involved in the retraction-invasion dynamics are closely related and hybridize this is predicted to cause changes in the dynamics of interspecific gene flow and impact the gene pool of the interacting species. This may pose an additional threat to the species, but may also provide new opportunities for adaptation [5,6]. **Methods:** This work aims to quantify hybridization levels and characterizing genetic diversity between the parapatric mountain hare (*Lepus timidus*) and European hare (*L. europaeus*) populations in the French Alps, which are known to be affected by the invasion-retraction dynamics caused by climate changes, using RADseq (Restriction-site Associated DNA sequencing) data. **Results:** Our analysis will decipher the genetic exchanges occurring between these two hare species with opposing demographic trends and understand their genetic structure and gene flow dynamics. We also aim to identify introgressed outlier alleles that may be indicative of rapid adaptation driven by genetic exchanges, shedding light not only on patterns of hybridization, but also into the mechanisms driving species interactions and adaptation in the threatened Alpine ecosystem. **Conclusions:** This work is part of an undergraduate internship project from FCUP and will provide valuable insights into the

mechanisms underlying species interactions in a context of climate change, informing conservation strategies and enhancing our understanding of current biodiversity dynamics.

Keywords: genomics, biodiversity conservation, climate change, range-shifts, hybridization.

Acknowledgments

We would like to thank Klaus Hackländer, Alexey Kryukov, Franz Suchentrunk and University of Alaska for providing samples for this project. This work is supported by portuguese national funds from Fundação para a Ciência e a Tecnologia (FCT), through project “HybridChange”, PTDC/BIA-EVL/1307/2020. JMF is supported by FCT contract 2021.00150.CEECIND.

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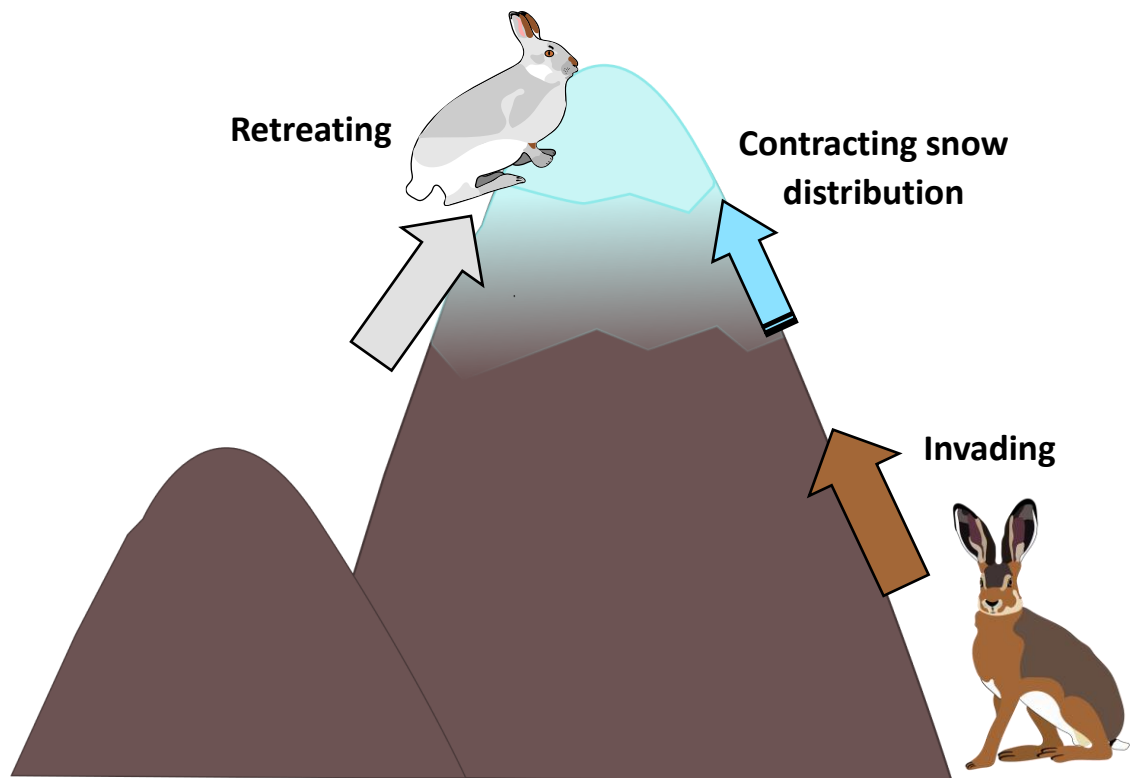


Figure 1: Schematic representation of range dynamics of European hare (*Lepus europaeus*), on the bottom right, and Mountain hare (*Lepus timidus*), at the top of the mountain, across the Alpine contact zone.

21876 | Development of a stable melanoma dual reporter cell line expressing Luciferase and GFP

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Background & Aim: Melanoma is the most aggressive and lethal form of skin cancer, with a high risk of metastatic spread [1]. Obesity is recognized as a risk factor for various types of cancer [2]. However, regarding melanoma, this association remains controversial. Obesity might act as a double-edged sword in melanoma, promoting primary tumour growth but at the same time limiting metastatic spread - the "obesity paradox" [3]. Herein, we aimed to create a stable murine B16F10 melanoma cell line expressing both firefly luciferase (Luc) and green fluorescent protein (GFP), which will later be engrafted into diet induced-obesity animal model for future *in vivo* studies. **Methods:** B16F10-Luc-GFP cells were generated by transfection with premade lentiviral particles, featuring a construct with Luc and GFP under a cytomegalovirus promoter and mediated by a F2A element. The antibiotic selection marker (puromycin) is expressed under a Rous sarcoma virus promoter. Afterwards, the transfected cells were selected with 1 µg/ml of puromycin. The clones with the highest levels of GFP-positive cells and GFP fluorescence were purified by two rounds of cell sorting and submitted to fluorescence and bioluminescence quantification, morphology, injury, BrdU incorporation, 7-AAD, and PI cell cycle assays and compared to the parental cell line. **Results:** B16F10-Luc-GFP were successfully generated, and both GFP fluorescence and D-luciferin bioluminescence are present and proportional to cell density. As expected, the parental cell line didn't display GFP or Luc activities. Moreover, transduced cells exhibit similar morphology, motility, proliferation, viability, and cell cycle progression as B16F10 cells. **Conclusions:** Altogether, the future engraftment of B16F10-Luc-GFP in obese mice, will improve melanoma research models, enabling the *in vivo* and *ex vivo* visualization of primary tumours and metastasis, providing a better understanding of the underlying molecular mechanisms, to clarify the "obesity paradox" in melanoma.

Keywords: Melanoma, B16F10, Obesity, GFP, Luciferase.

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21882 | Defining the genetic program regulated by the *Prrxl1* transcription factor in the embryonic development of spinal cord dorsal horn neurons

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Spinal cord dorsal horn (SCDH) neurons, comprised of both excitatory and inhibitory neural populations, play a critical role in processing nociceptive sensory information originating from dorsal root ganglion (DRG) neurons, which innervate the skin and deep tissues of the body [1]. During embryonic development a series of intricate cascade events, coordinated by different sets of transcription factors, determine the differentiation pathway a particular lineage of neurons will undergo, thus resulting in a multitude of neuron subtypes [2]. The paired-like homeodomain transcription factor *Prrxl1* is specifically expressed in both developing DRG nociceptors and excitatory neurons in SCDH [3, 4]. Analyses of *Prrxl1* knockout mice have revealed its essential role in neuronal migration, differentiation, and axon guidance, ultimately contributing for the proper formation of the DRG-SCDH nociceptive circuitry [3, 4]. However, the underlying molecular mechanisms remain poorly understood. Our investigation intends on evaluating *Prrxl1* transcriptional activity by focusing on enhancers from validated *Prrxl1* target genes, previously identified by our team in the embryonic dorsal spinal cord. We explore nine selected enhancers, which were annotated to genes exclusively expressed in either excitatory or inhibitory neurons, by constructing luciferase reporter plasmids. These will be used for transcriptional reporter assays using a neuronal hybrid cell line (i.e. ND7/23 cells) to determine whether the enhancers in question respond to *Prrxl1*. If so, we will perform site-directed mutagenesis to pinpoint the binding sites responsible for mediating *Prrxl1* transcriptional activity. With this study, we aim to uncover the transcriptional mechanisms controlled by *Prrxl1* in regulating the expression of its target genes. We foresee that by defining the genetic program controlled by the transcription factor *Prrxl1*, we will better understand how the diverse subtypes of SCDH excitatory neurons are generated.

Keywords: Spinal Cord Dorsal Horn, Neurons, Embryonic Development, Transcription Factor *Prrxl1*, Target Genes.

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21885 | Macrobenthic assemblages of seagrass meadows and bare sediment in intertidal flats on the Mira Chanel (Aveiro)

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Background & Aim: The Mira Chanel, in the Ria de Aveiro, presents seagrass meadows, which are considered “habitat-forming” species because their roots, shoots and leaves provide habitat and bring better conditions to other organisms. Macrobenthos includes organisms that live intimately associated with the bottom such as mollusks (bivalves and gastropods), annelids or crustaceans and are larger than 0.5 mm. This study aims to better understand the impact of a specific seagrass, *Zostera noltei*, in the diversity and abundance of macrobenthos by comparing the structure of macrobenthic assemblages living on seagrass habitats and bare sediments.

Methods: The work was divided in 3 steps: sampling (on the field), sorting and identification of macrobenthos. Sediment samples were collected with a corer at three different sites in the Mira Channel, considering, at each site, two kinds of habitat (*Zostera noltei* and bare sediment). Samples were washed in a 0.5 mm mesh size to retain macrobenthos that was preserved in formalin. In the sorting, macrobenthos was separated from the sediment in higher level of taxonomical aggregation (annelids, mollusks, crustaceans, and others). Finally, macrobenthos was identified to the lowest taxonomic level (species whenever possible). **Results:** Our results showed that the abundance and diversity of macrobenthos was higher in *Zostera noltei* habitats than in bare sediments. Therefore, this study points out the relevance of seagrasses for biodiversity and highlights the necessity of adopting measures that ensure its conservation.

Conclusions: The results prove that the specific seagrass, *Zostera noltei*, has a positive influence on the Macrobenthos’s distribution and diversity by the higher number of Macrobenthos found in *Zostera noltei* containing samples than the bare sediment ones. We can conclude that the presence of *Zostera noltei* in the Mira Channel provides an ideal habitat for a greater diversity in Macrobenthos and therefore the importance of their conservation.

Keywords: Macrobenthic Assemblages, Bare Sediment, Seagrass Meadows, *Zostera Noltei*.

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21891 | Metabolic profiling of polyphenols of grapevine leaves challenged by

Phyllosticta ampellicida

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Background & Aim: Vineyards stand as complex ecosystems, intertwining the artistry of viticulture with the delicate balance of ecological dynamics. The Douro Valley, a notorious region for its rich winemaking, is currently a “hot spot” for climate change. This susceptibility aggravates diseases, of which *Phyllosticta ampellicida*, the causal agent of black rot disease, stands as a threat to producers. To limit its impact on grapevine’s health and promoting sustainable viticulture operations, it is imperative to understand how this phytopathogenic fungus affects grapevines. The objective of this study is to characterize the shifts in polyphenol (flavonoids and phenolic acids) profiles of field grapevines when challenged by *P. ampellicida*.

Methods: Hence, leaves of *Vitis vinifera* var. ‘Touriga Nacional’ were collected from three vineyards in the Douro region. Five black rot symptomatic and five asymptomatic plants were selected from each vineyard ($n=5$). From each plant, three leaves were sampled for laboratory analysis. The presence of the fungus in symptomatic leaves was confirmed by PCR using specific primers. Flavonoids were extracted with an ultrasonic bath and hydrolyzed with HCl. Myricetin, quercetin, luteolin, kaempferol and apigenin quantification was performed by HPLC-DAD.

Results: *P. ampellicida* infection leads to a significant reduction in luteolin and kaempferol concentration. These results are like those reported for grapevines challenged with *Phytoplasma vitis*. Considering these preliminary results, in addition to flavonoid aglycone analysis, we are currently quantifying phenolic acids, namely ferulic acid, chlorogenic acid and caffeic acid (part of the lignin pathway), to fully understand this disease’s impact on the plant. **Conclusions:** The results are being integrated with other metabolites and hormone levels, and gene expression to develop, to our knowledge, the most complete model regarding the polyphenolic profile of grapevines challenged by *P. ampellicida*.

Keywords: Black Rot, Grapevine, Flavonoids, Phenolic Acids, Lignin Pathway.

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21894 | Optimization of sustainable methods for kelp reforestation

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Background and Aim: Kelp forests play crucial roles in marine ecosystems providing habitat and food, supporting coastal economies, and acting as carbon sinks [1]. Over the past decades, Portugal has witnessed a concerning trend of local extinctions and population fragmentation among kelp forests, primarily attributed to the impacts of climate change. Recognizing the importance of restoring these marine forests [2], this study evaluates the optimization of sustainable methods for the reforestation of *Saccharina latissima*, a cold-water kelp whose distribution is limited to northern Portugal. We evaluated the performance of two biodegradable fibers on kelp growth, to identify an environmentally friendly substrate for reforestation efforts. **Methods:** After collecting reproductive tissue of *S. latissima* in Amorosa, spore release was conducted in the lab [3]. Gametophyte density in the seeding solution was measured via optical density, establishing a calibration curve linking optical density to gametophyte weight [4]. Following seeding, algae growth will be monitored weekly with nutrient supplementation. Recruit growth will be analyzed using ImageJ and subsequently statistically evaluated. **Results:** Previous experiences with another kelp species revealed a significant effect of the fiber type on recruit numbers [5]. Cotton fibers showed better performance, with a higher number of recruits compared to sisal fibers. Initial findings suggest that we expect to achieve comparable results and obtain a better understanding of these cultivation techniques. **Conclusions:** Optimization of reforestation techniques is fundamental to addressing the decline of marine forests, allowing future upscaling of restoration efforts. While nylon or polypropylene ropes are typically used for cultivation, there is a growing interest in environmentally friendly materials such as cotton and sisal fiber to lessen the impact on the environment of any large-scale reforestation efforts.

Keywords: Marine Forests, Reforestation, Kelps, Habitat Restoration.

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21904 | Deciphering Toxicity in the Reef: Transcriptomic Analysis of Stony Corals

Venom

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Background & Aim: Stony corals (Cnidaria: Scleractinia) are one of the key species of our oceans and are highly affected by global warming. Recently, stony corals have been investigated for another reason: their capacity to produce venom [1]. However, only 4.80% (16/333) of Cnidaria toxins present in Uniprot/ToxProt are specific to stony corals. In this study, we intend to identify novel toxins in stony corals, as they may have high potential in biomedicine [2] and provide interesting clues about species ecology and evolution [3]. **Methods:** For this purpose, we analyzed the annotated genome of *Acropora millepora*, 3 tentacle transcriptomes of 3 *Goniopora* species, and 3 transcriptomes of other species that have an associated genome assembly (*Catalaphyllia jardinei*, *Galaxea fascicularis* and *Meandrina meandrites*) to identify orthologs toxin-gene sequences. From these transcriptomes, 5 were de novo assembled. Candidate coding-regions within transcript sequences were screened, followed by homology searches using blastp and Hidden Markov Models against publicly available databases (UniProt/ToxProt, NCBI, and VenomZone) for posterior annotation. **Results:** The completeness scores of the assembled transcriptomes ranged from 96.4% to 97.0% (Figure 1). We detected 184 to 553 probable toxin-like genes in the Uniprot/ToxProt database; 453 to 764 in the NCBI database; and 32 to 159 in the VenomZone database (Figure 2). **Conclusions:** Our findings allow us to conclude that the toxic repertoire of stony corals is vast, which will allow for a better interpretation of their venom. In the future, we aim to start with the final toxin annotations, followed by phylogenetic analysis of selected toxin families and genome mapping.

Keywords: Cnidaria, Venom, Scleractinia, Transcriptomes.

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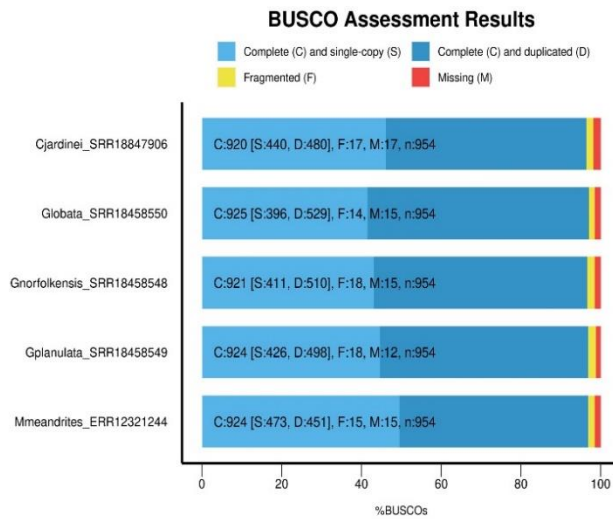


Figure 1. BUSCO assessment results for the assembled transcriptomes. The completeness scores ranged from 96.4% to 97.0%.

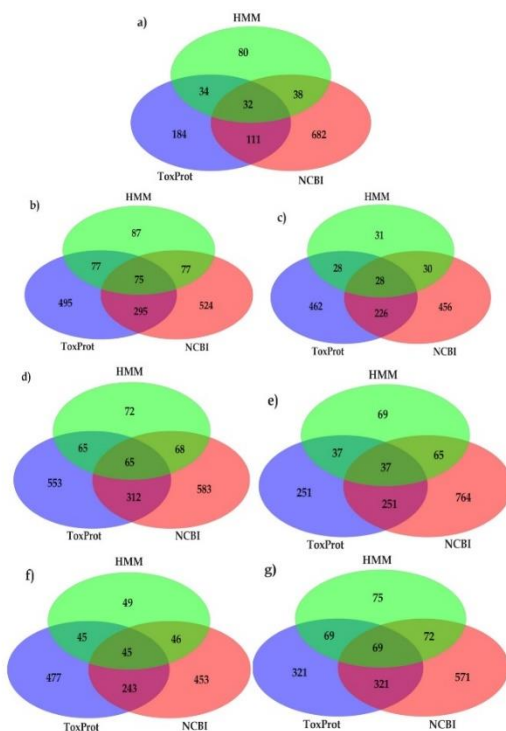


Figure 2. Venn diagrams representing the number of probable toxin-like genes detected in the 7 coral species: a) *Acropora millepora*; b) *Catalaphyllia jardinei*; c) *Galaxea fascicularis*; d) *Goniopora lobata*; e) *Goniopora norfolkensis*; f) *Goniopora planulata*; g) *Meandrina meandrites*.

21915 | Curving Actin Rings: Anillin and IQGAP in the axonal periodic skeleton

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The neuronal cytoskeleton, comprising microtubules, neurofilaments, and actin filaments, is critical for maintaining the structural integrity of neurons while promoting axonal growth and transport. Actin plays a pivotal role in cell morphology and dynamics, especially in neuronal polarization and axon/dendrite development. However, the organization of actin within axons has been less explored [1,2]. Recent breakthroughs in super-resolution microscopy within axons have unveiled an exquisite organization of actin – known as the membrane periodic skeleton (MPS). The MPS is formed by periodically distributed actin rings spaced by approximately 190 nm, interconnected by tetramers of β II-spectrin [3]. MPS was initially considered to provide mechanical support to axons. Our group contributed to the field by elucidating the role of the MPS in regulating axon diameter via adducin [1] and non-muscle Myosin II (NMII) [2]. Since there is still a lack of understanding regarding MPS biology, we aim to fully comprehend its biogenesis and function. Currently, actin nucleation within the actin rings is being investigated, but a critical unresolved question involves the mechanisms of actin circularization and the biochemical components implicated. Our work aims at investigating the roles of Anillin and IQGAP in determining the curved geometry of actin rings within the MPS. For that, we employ genetic approaches, including Crispr-Cas9 and tau STED microscopy, to explore the involvement of these proteins in MPS formation and maintenance in primary hippocampal rat neurons. So far, our results suggest that IQGAP1 protein is mostly involved in actin circularization during the maintenance of the MPS but during its initial formation. Our data will contribute to unravel neuronal cell biology.

Keywords: Membrane Periodic Skeleton, Actin Rings, Axonal Contractility, Super-Resolution Microscopy.

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21957 | Molecular Approach for Insect Detection in Feed: The Case Study of *Tenebrio molitor* and *Hermetia illucens*

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Background & Aim: In modern European food production systems, there's a growing interest in insects as a food and feed ingredient to meet the dietary requirements of aquaculture and human consumption. According to the Food and Agriculture Organization (FAO), insect-derived products emerge as a promising solution due to their potential to supplement or replace traditional proteins in a sustainable and eco-friendly manner. However, the high demand for innovative and disruptive protein sources also raises concerns about fraud. With the authenticity of insect-based animal feed in the spotlight, the industry is focusing on certifying insect-based products using cutting-edge technologies, such as methods based on DNA analysis. This work aims to develop a real-time PCR assay for detecting of Yellow mealworm (*Tenebrio molitor*) and Black soldier fly (*Hermetia illucens*) in commercial feeds. **Methods:** Two different DNA extraction methods were tested and compared, based on initial volume, extraction time, the gDNA concentration, and quality ratios. After PCR reproducibility evaluation, the cytochrome b (cytb) and NADH dehydrogenase subunit 4L as target genes were selected based on their discrimination power. **Results:** The NucleoSpin Food kit proved to be the most effective. Additionally, the species-specific primers, designed based on the mitochondrial gene sequences, successfully discriminated between the two insect species. **Conclusions:** DNA-based approaches offer high specificity, reproducibility, and economic viability for insect identification, even in highly processed samples. Consequently, they represent an ideal state-of-the-art tool for ensuring the authenticity of novel protein sources.

Keywords: Novel Feed Ingredients, DNA Extraction, PCR, Authenticity.

Acknowledgments

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21962 | Herbicidal effects and environmental safety of a eucalyptus-based nanoparticle

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Background & Aim: Nowadays, given the need to enhance agri-food production to meet the needs of a growing population, there is a huge dependence on synthetic pesticides. However, the recurrent and continuous application of pesticides has resulted in severe contamination across all environmental domains. So, it becomes necessary to develop sustainable strategies aiming at reducing the use of synthetic agrochemicals. Essential oils (EO) extracted from *Eucalyptus globulus* leaves have numerous biological activities, including herbicidal properties. However, its high hydrophobicity nature might hamper its large-scale application. In this sense, the main objectives of this work were to evaluate the herbicidal activity of a lipid nanoparticle incorporating a eucalyptus essential oil (LN-EO), and to ascertain its environmental safety using tomato plants (*Solanum lycopersicum*) as a model non-target species. **Methods:** To achieve this, different concentrations (25%, 50%, 75% and 100% v/v) of LN-EO and the EO were applied by foliar spraying to two-week-old purslane (*Portulaca oleracea*) seedlings. Deionized water (dH₂O), Tween-20 (EO solvent) were used as controls. **Results:** After a 4-week period, the results revealed that EO at 75% caused a 45% mortality rate of seedlings compared to the control (dH₂O), showing the greatest herbicidal effect among the various treatments. Although the herbicidal activity of LN-EO at 100% was not as effective as that of 75% EO, it induced the most severe effects on root length and fresh mass compared to the control (dH₂O). To assess the environmental safety of LN-EO, soil from pots where purslane seedlings had been treated with LN-EO and EO at 75% and 100%, as well as with Tween-20 and dH₂O, were collected, mixed, and distributed into new pots, in which one-week-old tomato seedlings were planted. This assay is currently ongoing, and after one month, parameters related to plant growth will be evaluated. **Conclusions:** Overall, the obtained results point out that LN-EO was less toxic for purslane seedlings than EO.

Keywords: Bioherbicide, Sustainable Agriculture, Weed Management.

21965 | Sterilization Methods of Medical Devices: A Review

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Background & Aim: Healthcare-associated infections constitute a threat to patient safety and are highly related to medical devices used in medical procedures. [1][6]. Thus, these medical devices need special attention on their manufacturing process and quality control. To overcome this issue, international standards and regulations are put in place to prevent infections and protect the patient [2]. Medical devices are made of different materials such as plastic, glass, metal, ceramics, polymers, among others [3] and must be packed accordingly before sterilization in order to maintain the sterility status after the sterilization process while maintaining the packaging integrity [1][4][5]. Sterilization plays vital part on the manufacturing of these devices as it allows the inactivation of microorganisms that may cause infection or diseases. [3] The sterilization method to be used takes into account the materials used in the production of such devices to have minimum impact on their physical and chemical properties, as well as their packaging [3][4]. **Methods:** In this poster, it was gathered information about the different sterilization methods in literature (Google Scholar and PubMed) to assess the most reliable methods available for the sterilization of Medical Devices being sterilized. **Results:** Literature as shown that there are a range of different methodologies for the sterilization of medical devices, each with their advantages and disadvantages, that must be chosen carefully according to materials used in their production and packaging. **Conclusions:** The most commonly used sterilization methods for medical devices are sterilization by ethylene oxide, radiation, moist heat (autoclave), dry heat, and low temperature steam and formaldehyde. Despite the wide range of sterilization methods, the optimal choice considers a series of different factors such as compatibility, initial and maintenance cost, cycle time, level of sterility and so on. Thus, ultimately each medical device manufacturer must carefully assess all advantages and disadvantages of each method and chose accordingly which one better suits their product, packaging and budget.

Keywords: Medical Devices, Sterilization, Infection Risk, Quality Control.

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21980 | A biomarker-based model for early cancer detection in Hereditary Diffuse

Gastric Cancer

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Background & Aim: Hereditary Diffuse Gastric Cancer (HDGC), caused by *CDH1* loss, predisposes individuals to the development of diffuse gastric cancer¹. Due to its incomplete penetrance, *CDH1*[±] patients remove stomach before disease onset, reducing mortality rates². However, this hampers the possibility of studying the disease *in vivo*, claiming for a biomarker signature to predict early-cancer initiation. The goal of this project is to validate a model for biomarker collection, based on organ-on-a-chip technology, and to prototype a HDGC-on-a-Chip (HoC). **Methods:** A stomach-on-a-chip (SoC) emulating the gastric mucosa was developed using a fabrication method based on xurography. This model was analysed with immuno-fluorescence, enzymatic and trans-epithelial transport assays. Besides, peripheral mononuclear blood cells, from HDGC families, were isolated and induced pluripotent stem cells (iPSCs) were generated and established in a biobank. Moving forward, normal and cancer gastric cells will be co-cultured and luminal and endothelial fractions will be characterized by LC-MS, RNA seq, small RNA seq and bioinformatics tools. Additionally, a HoC model will be prototyped using a methodology already validated³. **Results:** The SoC produced showed to be a loyal replicate of the stomach, mimicking, among other features, the 3 inner gastric layers, the gastric lumen, peristaltic-like

motion and barrier function. Also, patient-derived iPSCs were characterized, validated, for pluripotency, and established. We now aim to adapt our SoC design to prototype the patient-derived HoC and predict the lowest density of CDH1^{-/-} cells producing a specific and measurable molecular signature in the established *in vitro* model. **Conclusions:** Overall, we achieved to develop valuable technological and cellular models emulating stomachs that no longer exist from CDH1^{+/-} patients, allowing the study of a cancer-specific biomarker signature. This technology could have a positive impact on patient management and quality of life.

Keywords: HDGC, *CDH1*, HDGC-on-a-chip, Stomach-on-a-chip, iPSCs.

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21987 | Unravelling proline dynamics – the duality of accumulation in *Solanum lycopersicum* L. under osmotic stress

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Background & Aim: Climate change paired with intensified agricultural practices negatively affect soil properties, leading to significant impacts on plant productivity and crop losses. Upon osmotic disturbances induced by salinity and water deficit, plants accumulate proline - a molecule with osmoprotectant and antioxidant roles - often associated with stress tolerance [1]. However, recent studies suggest that excessive proline accumulation in plant cells does not directly correlate with improved redox homeostasis but is perceived instead as a stress signal [2]. Thus, the present study aims to elucidate how plants coordinate proline accumulation and metabolism during osmotic stress and subsequent recovery period. **Methods:** For this purpose, a bifactorial experimental design was conducted using tomato plants (*Solanum lycopersicum* L. cv Purple Calabash) grown in a semi-hydroponic system with Hoagland nutrient solution. Plant samples were collected for analysis at three different time points: after 20 days of growth under controlled conditions (t0); after four days of exposure to 8% (w/v) polyethylene glycol (PEG) (t1); and after plants exhibited visible signs of recovery (t2). **Results:** Exposure to PEG for four days resulted in decreased shoot growth, reduced root length, and an expected increase in proline accumulation, hydrogen peroxide level and lipid peroxidation degree. After stress alleviation, proline and hydrogen peroxide levels continued to rise, and lipid peroxidation returned to control levels. Further analysis will focus on assessing enzymes involved in both the biosynthesis and degradation of proline. Gene expression analysis and enzyme activity assays will be carried out. **Conclusions:** Altogether, the results obtained in this study will contribute to elucidate proline's role and disclose the dynamics of its metabolism during stress exposure and after recovery.

Keywords: Abiotic stress; stress tolerance; tomato plant; antioxidant potential; osmoprotection

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21994 | Virtual proteolysis strategy to explore the repertoire of antimicrobial peptides from Cnidaria

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Background & Aim: Cnidaria (corals, sea anemones and jellyfish) is a phylum well-known for their defensive mechanisms, which have a significant role in their survival. These include specific bioactive peptides known as antimicrobial peptides (AMPs), which exhibit a variety of natural immune activities [1]. Although AMPs have a crucial role in cnidarian's lives, only a few peptides are known (10 entries in UniProt database). In this study, we intend to find and gather fresh data on unidentified AMPs through a virtual proteolysis strategy, offering valuable resources for upcoming antibiotics to fight antimicrobial resistance (AMR) [2]. **Methods:** For this purpose, 7 protein datasets were created with data available at transcriptomic (101) and proteomic (8) level from cnidarians (Anthozoa and Medusozoa). From these, a total of 34 transcriptomes specific to the tentacles and nematocysts were de novo assembled, followed by a quality check. Then, the Jaccard Index was used as a pairwise similarity metric to allow an all-vs-all comparison among databases, followed by an *in silico* antimicrobial prediction in full length proteins. **Results:** The completeness scores of the assembled transcriptomes ranged from 50.3% to 98.2% (Figure 1). Additionally, the individual databases were rather unique compared to each other (Figure 2). The antimicrobial screening resulted in a total of 1 939 076 proteins for posterior virtual proteolysis. **Conclusions:** Our findings allow us to conclude that each protein database can gather unique information about potential AMPs specific to cnidarians. In the future, we aim to start with the *in silico* digestion with various enzymes, culminating in new peptide datasets. Then, an antimicrobial and toxicity screening will be carried out to select non-toxic and non-hemolytic AMPs with biomedical potential.

Keywords: Cnidaria, Antimicrobial, Proteolysis.

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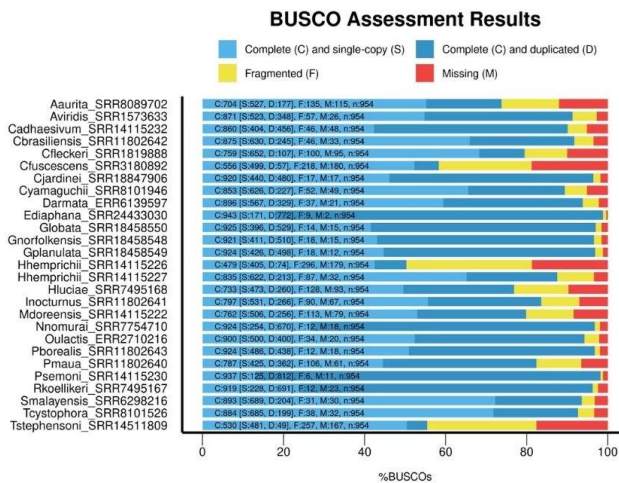


Figure 1: BUSCO Assessment Results for the assembled transcriptomes specific to the tentacles and nematocysts. The completeness scores ranged from 50.3% (SRR14115226) to 98.2% (SRR14115230). Transcriptomes with completeness score below 50% were removed (not represented in the figure).

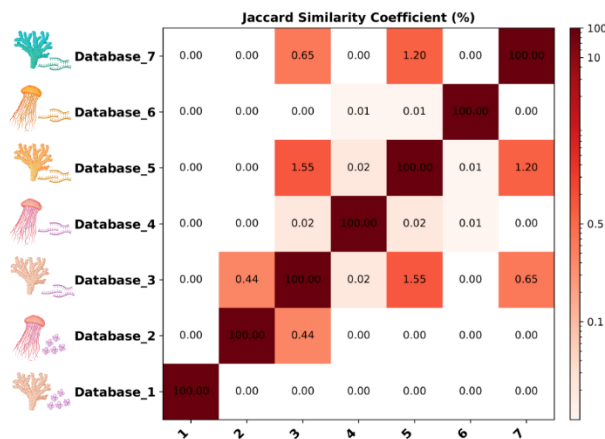


Figure 2. Jaccard Similarity Coefficient of the 7 Cnidaria databases displaying the diversity of each database in all vs-all comparison. The red appears darker the more alike they are. Database 1 – Proteomic data of Anthozoa; Database 2 – Proteomic data of Medusozoa; Database 3 – Non-specific transcriptomic data of Anthozoa; Database 4 – Non-specific transcriptomic data of Medusozoa; Database 5 – Tentacle transcriptomic data of Anthozoa; Database 6 – Tentacle transcriptomic data of Medusozoa; Database 7 – Nematocyst transcriptomic data of Anthozoa.

22002 | Sustainable antifouling agents: hazard assessment of novel solutions

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Background & Aim: Antifouling coatings are essential to ensure optimal navigation conditions and reduce propagation of exotic species by preventing organisms from settling on ship hulls. An array of solutions has been employed to prevent fouling, but several have shown sideline disadvantages. Once bioavailable, the components of these paints can be toxic or act as endocrine disrupting chemicals (EDCs), since these exogenous molecules may mimic or interfere with the signaling of endogenous hormones. Therefore, developing new and ecofriendly alternatives to prevent this issue is critical. Ecotoxicological assays are a great tool for testing and assessment of toxic potential and can be applied to new “ecofriendly” antifouling compounds to evaluate the environmental hazard and associated risks. **Methods:** *Danio rerio* (zebrafish) has become a recognized model species in ecotoxicological studies due to its small dimensions, short life cycle, high fecundity and translucent eggs that allow for embryo development analysis. Therefore, in this work, standardized tests using zebrafish embryos, and following OECD guidelines (OECD Test No. 236 FET), were used to evaluate the ability of novel antifouling compounds, synthesized at CIIMAR/FFUP, to induce toxicological and sublethal effects. **Results:** Preliminary results suggested these compounds to have anti-settlement activity for *Mytilus galloprovincialis* larvae with no apparent toxicity against the larvae, or against a non-target organism (i.e. marine shrimp *Artemia salina*) in contrast to tralopyril, used in a commercial marine coating, which caused 100% lethality at the same concentration[1, 2]. In this work, FET assays revealed that the tested compounds did not yield toxicological effects upon exposure of zebrafish larvae; yet, a sublethal analysis is still required. **Conclusions:** Promising new compounds will be deeply screened for their toxicity, thus contributing to label the new solutions as actual ecofriendly antifouling compounds.

Keywords: Antifouling, Endocrine Disruptor Assessment, Safer Chemicals.

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22005 | Pygmy Hippopotamus (*Choeropsis Liberiensis*) Behaviour: A Practical

Ethogram to Assess Enrichment in Captivity

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Background & Aim: Monitoring animal behavior is crucial, as it helps to understand individual conduct, social interactions, needs and welfare across species. It also facilitates research of the habitat use and the impact of external factors on typical behavior patterns. To achieve this, the development of an ethogram is fundamental. Defined as an individual's natural behavior set, the ethogram serves as a systematic framework for observing, recording, and categorizing different behaviors. By standardizing the terminology and criteria used to describe behaviors, ethograms facilitate consistent and objective data collection, allowing researchers and keepers to accurately document and analyze animal behavior over time. Here, we aimed to develop a practical ethogram of the pygmy hippopotamus (*Choeropsis liberiensis*) residing at the Santo Inácio Zoo, Portugal. This ethogram was used to evaluate the effectiveness of some environmental enrichment elements provided to this animal. **Methods:** Based on *ad libitum* observations, an ethogram was developed for the pygmy hippopotamus. Subsequently, systematic observations were made, during which the animal's behaviors were recorded every 30 seconds for 30 minutes in response to the presence of curry throughout the habitat, two logs containing food placed in the pool, or to a floating barrel in the pool. A total of 54 hours of observation were conducted both with and without enrichment. **Results:** A total of sixty-six different behavioral patterns were observed. These behaviors were then classified according to the following categories (Figure 1). Preliminary results of Environmental Enrichment are encouraging since we observed an increased in behavioral diversity. **Conclusions:** An ethogram is the foundation on which scientific research and animal care practices are built, providing a detailed understanding of behavioral patterns, which is essential for designing enrichment programs, assessing animal welfare, and promoting a better understanding of species.

Keywords: Pygmy Hippopotamus, Animal Behavior, Environmental Enrichment.

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Figure 1: Ethogram of pygmy hippopotamus (*Choeropsis liberiensis*) in captivity.

22012 | Unravelling the genetic basis of divergent social behaviours in *Mus spicilegus* and *Mus macedonicus* through whole genome sequencing

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Background & Aim: Our modern ability to generate and analyse the sequences of the complete genome of individuals provides unprecedented power to tackle the genetic variation underlying relevant adaptations of organisms. Despite their morphological and genomic similarities, the sister species *Mus spicilegus* and *Mus macedonicus* exhibit markedly distinct behaviours¹. While *Mus spicilegus* individuals cooperate in building large mounds for storage and nesting, *Mus macedonicus* are known to be solitary and aggressive. This study employs whole genome sequencing (WGS) data to investigate whether these distinctive behavioural traits can be genetically determined. **Methods:** First, we will quantify the magnitude and characterize the history of their genetic divergence, using WGS data from individuals of the sister species and using multiple samples from different *Mus musculus* subspecies as an outgroup. In addition, behavioural data will be integrated with the information obtained from genome scans to identify potential candidate genes associated with behavioural traits. **Results:** We anticipate validating prior research indicating a close genetic relationship between these species, resulting from a recent divergence. Such similarity is expected to increase our power to detect regions of the genome underlying key differences. In keeping, our investigation will seek to uncover evidence supporting a genetic foundation for the divergent social behaviours or lay the groundwork for future studies in this domain. **Conclusions:** This research constitutes an integral component of an undergraduate internship project conducted at the Faculty of Sciences, University of Porto. By delving into the genetic determinants of distinct social behaviours in mice, our study aims to provide valuable insights that contribute to the broader understanding of evolutionary and behavioural biology.

Keywords: Genomics, Social Behaviours, *Mus*.

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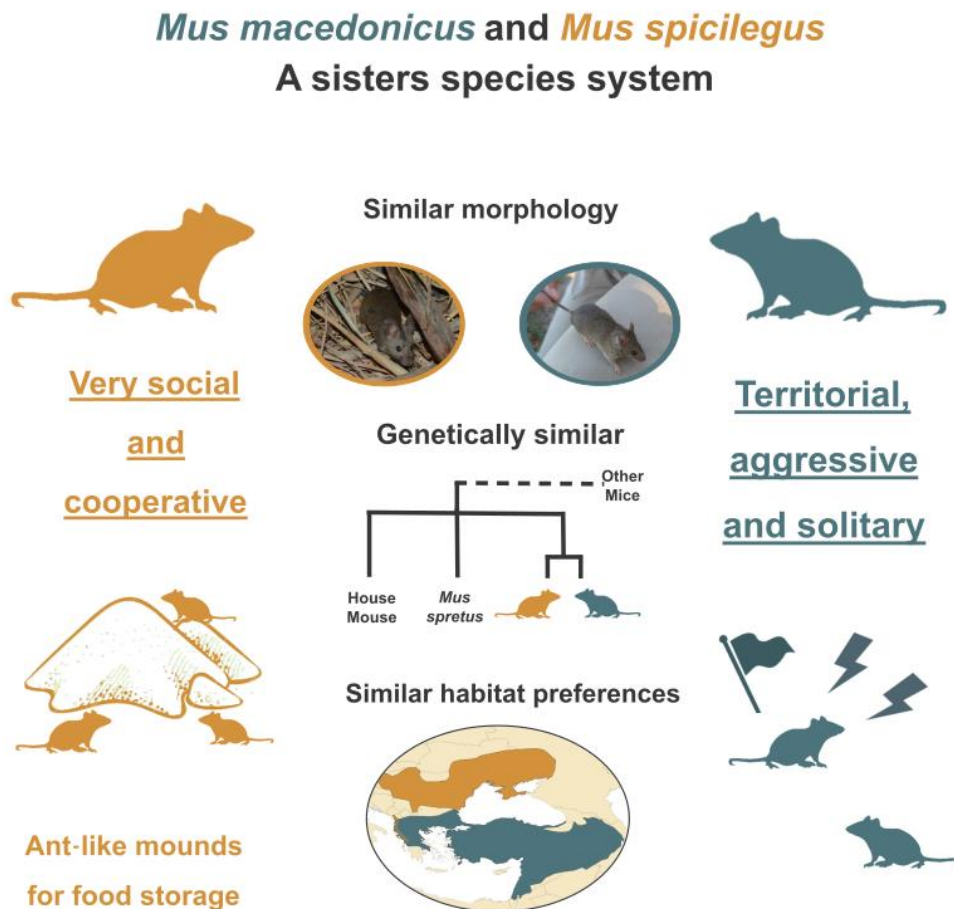


Figure 1: *Mus macedonicus* and *Mus spicilegus*, A sister species system

22018 | Investigation of the regulation of root nodule formation by ammonia and peptide phytohormones in the model plant *Medicago truncatula*

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Background & Aim: Plants are able to assimilate the key element nitrogen (N) from the soil mainly as nitrate (NO₃) or ammonium (NH₄), but legumes are also able to exceptionally access atmospheric-N (N₂) through symbiosis with diazotrophic bacteria of the *Rhizobium* genera. The aims of this work were to analyze the expression profile of two families of peptide hormones, the Rapid Alkalinization Factors (RALF) and the C-terminally Encoded Peptide (CEP) in the model legume *Medicago truncatula* and, to evaluate whether they regulate root nodule development, the special organ where symbiotic N₂-fixation (SNF) takes place, in response to inorganic N-supply. **Methods:** Plants grown under different N-regimens (N-free, low-NH₄, low-NO₃, high-NH₄ or high-NO₃) were inoculated with *Sinorhizobium meliloti* to induce SNF, or mock-treated. Differential transcript expression of 11 genes encoding CEP peptides and 6 genes encoding RALF peptides was analyzed independently in roots and shoots collected from 3-week-old plants, with two-step quantitative PCR (qPCR). **Results:** Analysis of the expression of peptide hormones showed that several genes of the CEP family are upregulated by low-N and N-starvation in the roots of mock-treated plants with the notable exception of 2 members whose expression in roots is enhanced in response to external N-supply and SNF. As for the RALF family, we identified an increase of transcript expression of 4 members in roots by nitrate but exclusively in SNF conditions. **Conclusions:** In this work, we have obtained preliminary data on the expression profile of genes belonging to the CEP and RALF families in *M. truncatula* grown under different N-sources. Experiments are underway to overexpress one RALF and one CEP in roots, through Gateway recombinant cloning technology and *Agrobacterium rhizogenes* mediated root-transformation, to understand their partaking in root nodule development and function.

Keywords: *Medicago Truncatula*, Peptide Hormones, Nitrogen, Root Nodule Symbiosis.

Acknowledgments

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22023 | Demonstrating a role of Focal Adhesions strengthening in instructing premalignant cells progression to malignancy

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Background & Aim: Only 20-50% of premalignant breast lesions progress to invasive cancer, with the rest either regressing naturally or remaining stable(1). Yet, comprehensive characterization of the cellular and molecular alterations found in premalignant tissues are still missing, thus, is important to identify the mechanisms that drive these premalignant diseases. Recent studies have investigated the molecular connections between cell-cell adhesion via adherens junctions (AJs) and cell-matrix adhesion via focal adhesions (FAs). Janody's lab has reported that conditional activation of the Src proto-oncogene in the human mammary epithelial cell line MCF10A-ER-Src induces a morphologic transition from epithelial to mesenchymal, followed by the acquisition of migrating and invading abilities(2). Prior to this, MCF10A-ER- Src cells display a transient behavior, accumulating certain proteins at FAs and cell-cell contacts, trigger the activation of signaling pathways, which was demonstrated to be essential for the progression of breast cells from premalignant into malignant(3,4). This data suggests that AJs and FAs strengthening could play a key role in instructing the progression of premalignant breast cells to invasive cancer cells. Therefore, the aim of this project is investigating the state of FAs in the premalignant stage and determine if their strengthen is required for a progression to malignancy. **Methods:** FA size was assessed using segmentate images of MCF10A-ER-Src cells labelled with FA marker zyxin, and to weaken FAs, lentiviral particles carrying a shRNA against the FA protein paxillin were used. **Results:** Premalignant cells displayed larger FAs in cells maintaining AJs and polarized F-actin stress fibres. **Conclusions:** This data suggests that increased FA size could be associated with higher tension and a prerequisite for the progression of premalignant cells into malignancy.

Keywords: Focal Adhesions, MCF10A-ER-Src Cells, Premalignant.

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22028 | Bioengineering an immunomodulatory therapy for intervertebral disc degeneration

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Background & Aim: Low back pain (LBP) due to intervertebral disc (IVD) degeneration consists in significant health and economic burdens, with ineffective treatments [1]. Therapies for IVD using mesenchymal stem cells (MSCs)-based products hold great promise, but face several challenges, including their application in the IVD [2]. Decellularized extracellular matrix (dECM) can be a potential biomaterial-based delivery system due to high biocompatibility and lack of immune response [3]. Hence, we propose exploring dECM from bovine nucleus pulposus (NP) as a delivery system for MSC secretome (MSC-Sec) to modulate the immune response in IVD degeneration. **Methods:** NPs were obtained from young bovine IVD, decellularized in a vacuum system, and lyophilized, as optimized [4]. Decellularization efficacy was evaluated by DAPI staining. MSC-Sec was obtained as described [5] and lyophilized. dECM scaffolds underwent a 2-hour vacuum soaking in 10x-concentrated MSC-Sec. Secretome incorporation and release were assessed by dry weight and BCA assay, respectively. The immunomodulatory effect of MSC-Sec-loaded dECM (dECM-Sec) was tested in human monocyte-derived macrophages. Macrophage phenotype was evaluated by flow cytometry and cytokine secretion as described [6]. **Results:** dECM showed minimal DNA residues, ensuring process efficacy. Protein concentration in MSC-Sec was obtained with distinct cell densities (4000, 20000, and 40000 cells/cm²), peaking at 2.83 mg/mL for 20000 cells/cm². Secretome was successfully loaded in dECM, exhibiting a burst effect in the first 8 hours followed by sustained release, revealing their efficiency as delivery systems. Preliminary flow cytometry data suggest that dECM-Sec induce an M2 pro-regenerative phenotype. **Conclusions:** dECM from bovine NP shows promise as a delivery platform and secretome as a potential M2 phenotype stimulator, although further analysis is needed. These findings may contribute to developing an effective immunomodulatory therapy for IVD and, thus, LBP.

Keywords: Intervertebral Disc Degeneration, Secretome, Decellularized Extracellular Matrix, Delivery System, Immunomodulation.

Acknowledgments

This work was supported by Fundação para a Ciência e a Tecnologia (FCT) through FETBIO project (FCT-2020-PTDC/BTM-MAT/0438/2020). Monocytes/macrophages differentiation experiments were performed with the guidance of Ana Beatriz Sousa, PhD student attending the Doctoral Programme in Molecular and Cellular Biotechnology Applied to Health Sciences (BiotechHealth) at ICBAS.

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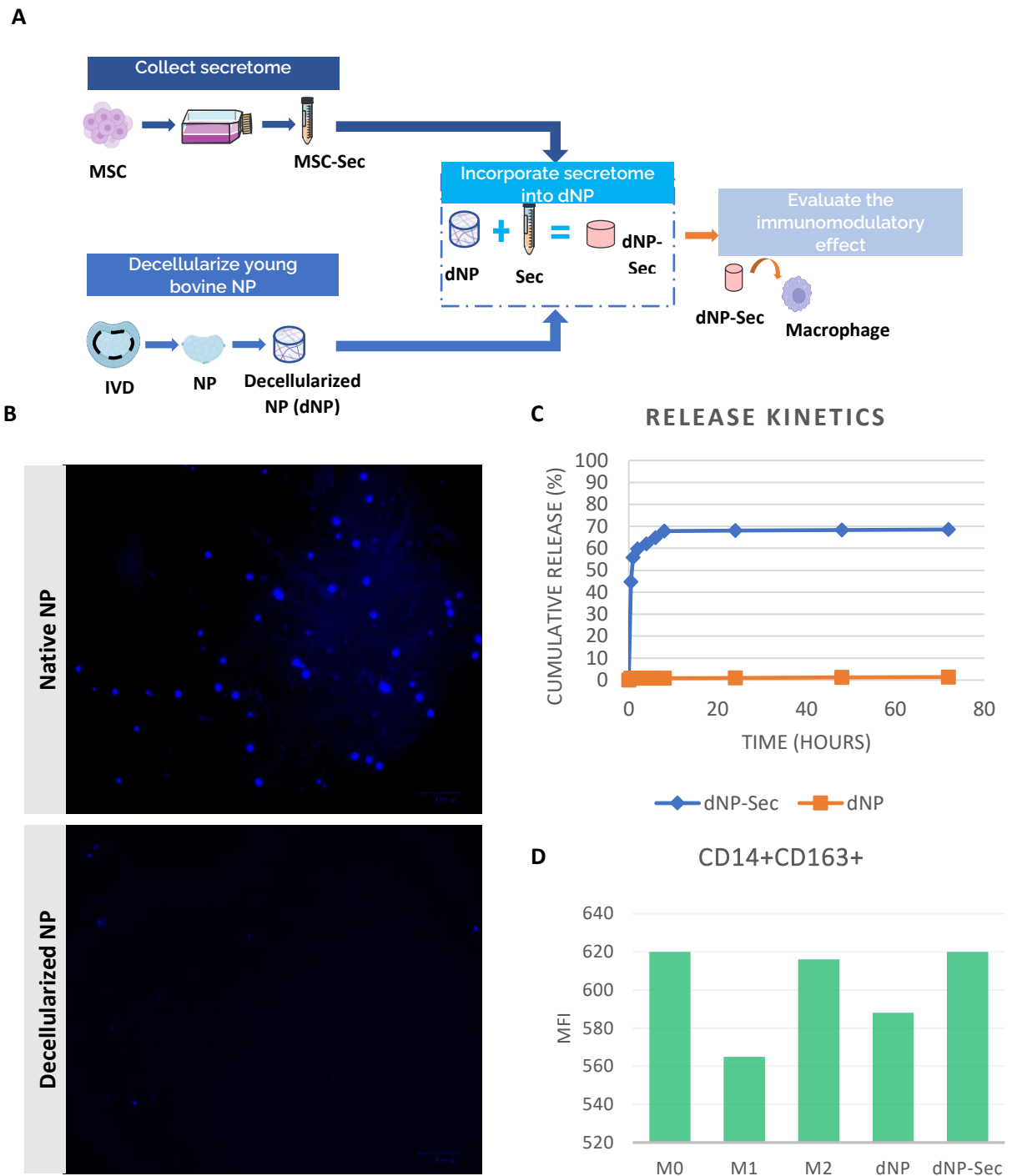


Figure 1: Overview of project tasks and initial outcomes. (A) Schematic representation of the project sequential stages. (B) DAPI staining of tissue sections from native and decellularized young nucleus pulposus (NPs). (C) Release kinetics from secretome-loaded decellularized NPs (dNP-Sec) and unloaded decellularized NPs (dNPs) at pH 7.4 and room temperature. (D) Median fluorescence intensity (MFI) of double-positive cells CD14+CD163+. M0=naïve/unstimulated macrophages; M1=LPS-IFN γ stimulated macrophages; M2=IL-10 stimulated macrophages.

22031 | Evaluation of cyanobacterial auxin production and its effects on plant growth

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Background & Aim: Increasing global population and food demand have led to more intensive farming strategies, mostly dependent on human health and environment-threatening compounds. One strategy to encompass this problem is the exploitation of soil-beneficial microbes as biofertilizers. Plant Growth-Promoting Rhizobacteria (PGPRs) constitute a group of soil bacteria that can improve plant growth and sustainably increase plant productivity. From these, cyanobacteria are one of the most important photoautotrophic organisms ubiquitously present in soils. Some species are recognized as nitrogen-fixating, but they can also produce a wide array of extracellular compounds including plant growth-promoting substances. like auxins, thus increasing root surface area and length, helping plants to access and uptake soil nutrients and water. In this work, we study the plant growth promotor effect of a cyanobacterium isolated from Portuguese soil and evaluate if Indole-3-acetic acid (IAA) production by cyanobacteria is responsible for its effect. **Methods:** The exudates were inoculated in *A. thaliana* and *Lactuca sativa* growth media and plant growth was evaluated. Aiming to assess if IAA production by cyanobacteria is the substance that promotes plant growth two approaches were followed: The Salkowski Reagent method was used to quantify IAA production and transgenic *A. thaliana* with an auxin-sensitive promoter associated with the reporter gene GUS, was grown in the presence of the cyanobacterium exudates and GUS staining was performed. **Results:** We observed an increase in root length and number of lateral roots, in both species and the results suggest that cyanobacterial IAA production can be responsible for the growth promotion effect observed. **Conclusions:** Identifying PGPRs is an alternative to the use of ecosystem-threatening fertilizers used in agriculture. This cyanobacterium, isolated from a Portuguese soil can be used in sustainable eco-agricultural strategies in native soils.

Keywords: Cyanobacteria, Plant Growth-Promoting, IAA.

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22065 | Engineering of Cyanobacterial Extracellular Vesicles for Modulating Fish

Appetite

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Background & Aim: Aquaculture is one of the fastest-growing food-producing sectors [1]. However, it faces numerous challenges, such as disease outbreaks and poor feed-utilization efficiency [1]. To mitigate the latter, we are currently investigating a sustainable alternative for modulating fish appetite. Ghrelin is an intestinal endocrine hormone, demonstrated to stimulate appetite [2]. Thus, it holds enormous potential for controlling animal growth and optimizing feed utilization [2]. Nevertheless, the challenge lies on its delivery to the animal. Extracellular vesicles (EVs) are bilayered nanostructures derived from the bacterial cell envelope, containing membrane components as well as soluble products [3]. These nanoparticles have garnered attention due to the retention of cargo's properties even under adverse conditions, and the ability of EVs to transport cargo to otherwise inaccessible targets [3]. In the case of cyanobacterial EVs, their potential has been recently demonstrated by carrying and delivering heterologous proteins to zebrafish larvae by oral administration [3]. Thus, the goal of this project is to develop efficient ghrelin-delivery approaches to fish for maximization of feed utilization, by using cyanobacteria as ghrelin microbial production platforms and cyanobacterial EVs as ghrelin nanocarriers. **Methods:** To this end, we are presently using Synthetic biology to express ghrelin in cyanobacteria, and load it into EVs. Both the engineered cyanobacterial biomass and derived EVs can be formulated in fish diets, and then, delivered to fish to modulate their appetite. **Results:** Presently, we are assembling genetic constructs to be transferred to cyanobacteria for expressing ghrelin under a specific promoter, and targeting it to EVs. In addition, we are also exploring the possibility of using different cyanobacterial strains for ghrelin expression. **Conclusions:** This work highlights that nature-based solutions leveraged on biotechnology can bring sustainability closer to Aquaculture.

Keywords: Aquaculture, Appetite, Cyanobacteria, Extracellular Vesicles, Synthetic Biology.

Acknowledgments

BYT+ program and CIIMAR out of the box seed project “UIDB_COB – Cyanobacterial”

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22073 | Looking to capitalize on agricultural by-products: Biological potential and chemical composition of *Actinidia arguta* (Siebold & Zucc.) Planch. ex Miq. (Kiwi Arguta) leaves and stems

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Background & Aim: The emerging trend of valorizing agricultural by-products entails their transforming into useful products, contributing to sustainable practices and economic opportunities within the agricultural sector [1]. This work aims deepen knowledge about chemical composition of *Actinidia arguta* (Siebold & Zucc.) Planch. ex Miq. by-products (leaves and stems) and provide additional data about biological potential. **Methods:** In this work, the pigment profiles of ethanol extracts obtained from leaves and stems of Kiwi arguta male and female plants were established by HPLC-DAD. The antioxidant capacity, as well the skin-whitening and anti-browning properties of the *A. arguta* leaves and stems were also assessed. **Results:** In general way, nine pigments, including xanthophylls, carotenes and chlorophylls were identified and quantified in *A. arguta* leaves and stems ethanol extracts, lutein, β -carotene and chlorophyll *a* being the major compounds found. Quantitative differences between male and female plants were observed. Preliminary results showed interesting antioxidant properties exhibited by all extracts, as by the potent capacity to scavenge physiologically relevant nitric oxide (\cdot NO) and superoxide anion ($O_2^{\cdot-}$) radicals, as for its ability to strongly inhibit the first stages of lipid peroxidation induced by the Fe^{2+} /ascorbate system. Moreover, all extracts displayed inhibitory activity towards tyrosinase, the main enzyme recognised as responsible for browning of fruits, fungi and vegetables and melanogenesis in mammals. **Conclusions:** The results obtained open doors to the use of *A. arguta* leaves and stems as novel skin depigmenting agents, can also play important roles in preserving natural color, texture, flavor, and nutritional content of fruits and vegetables, thereby extending their shelf life and enhancing their marketability.

Keywords: *Actinidia Arguta*, Leaves, Stems, Chemical Composition, Anti-Inflammatory.

Acknowledgments

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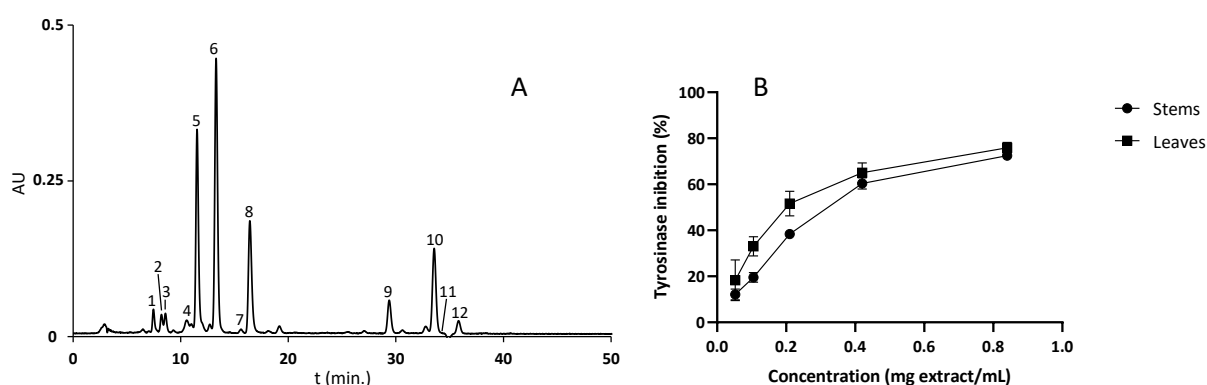


Figure 1: (A) Representative HPLC-DAD chromatogram of the carotenoid and chlorophyll profiles of ethanol extract obtained from *A. arguta* leaves. Detection at 450 nm. (1, 2) unknown xanthophylls, (3) neoxanthin, (4) chlorophyll *a* derivative, (5) chlorophyll *b*, (6) lutein, (7) zeaxanthin, (8) chlorophyll *a*, (9) α -carotene, (10) β -carotene, (11) pheophytin *a*, (12) unknown carotenes. (B) Tyrosinase inhibitory effect of *Actinidia arguta* leaves and stems ethanol extracts. Results are expressed as mean \pm SD of three independent experiments, each performed in triplicate.

22081 | Dynamics and evolution of immune multigene families in Lagomorphs: a comparative genomics approach

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Background & Aim: The immune system is pivotal for the adaptive capacity of organisms in response to diseases. The diversification of gene families along the evolution of species is one response to such selective pressures. Multigene families follow a dynamic birth-and-death evolution, marked by frequent duplications, deletions, pseudogenizations and neofunctionalization events [1]. The evolution of the immune system in Lagomorphs is known to have played an important role driving organismal diversification, indicative of unique evolutionary responses to selective pressures [2, 3]. This order includes pikas, rabbits and hares [4], representing 25-30 million years of evolution [5]. Yet lagomorph immune system studies have been predominantly centred on the European rabbit (*Oryctolagus cuniculus*) [6]. The modern fast increase in the number of available chromosome-level reference genomes provide novel opportunities to compare the structure of genes within genomes across species. These new genomic resources, including for Lagomorph species, enable detailed comparative genomics studies that tackle the evolution of gene families. **Methods:** Here, will use comparative genomics to characterize the evolution of genomes and immune system gene families in lagomorphs in two stages. The first will compare the structure of genomes of different species, using synteny analyses and inferences of phylogenetic orthology, to provide information about structural rearrangements and differences in genomic architectures in Lagomorphs. The second stage will analyse and catalogue multigene immune system families, using synteny analysis, phylogenetic gene trees and measures of genetic distances. **Expected results and conclusions:** This two-stage approach is expected to offer valuable insights about the evolution of genome structure and immune system adaptation in lagomorphs. Furthermore, it may provide key insights about potential correlations between genetic factors and susceptibility or resistance to different pathogens or diseases.

Keywords: Comparative Genomics, Lagomorphs, Immune System, Multigene Families.

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22100 | Gut parasite diversity gradient in freshwater and terrestrial hosts in arid

West Africa

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Background & Aim: Parasite diversity and distribution patterns are poorly studied [1]. Due to high host specificity and complex life cycles, parasites are particularly vulnerable to environmental alterations (e.g., habitat and climate change) [2], which may lead to negative consequences for hosts due to new patterns of parasitism [3]. This study aims to compare the parasite diversity-aridity relationship in wet and dry habitats using a freshwater carnivore, *Crocodylus suchus*, and a terrestrial omnivore, *Papio papio*, as host models. The following hypotheses were formulated: 1. Wet environments are expected to be less stringent for the survival of intermediate life stages of parasites, thus the aridity/parasite-diversity curve should drop faster in baboons; 2. Baboons are expected to have a more diverse parasite community due to omnivory. **Methods:** A systematic bibliographical review (SBR) was performed using the Global Mammal Parasite Database (GMPD) and Web of Science (WoS). The gut parasite community of 150 faecal samples from individuals across the Sahel was characterised using DNA metabarcoding, and MOTU-based diversity analysed in R [4]. Spatial parasite diversity patterns were correlated with environmental descriptors using QGIS [5] and regression models in R [4]. **Results:** The SBR screening revealed more available data for baboons, more morphological than genetic data, with nematodes as the most reported parasite group. Zoonotic parasites (e.g., *Entamoeba histolytica*) were identified. Preliminary work included the use of different primers and extraction methodologies to assess better results in terms of the identification of parasites. Data analyses are ongoing to determine which genes and primer sets provide more information on the metabarcoding of parasite taxa. **Conclusions:** This first metabarcoding study of gut parasites from co-occurring hosts with different feeding habits will offer valuable insights into parasite diversity, conservation, ecology and potential zoonoses distribution.

Keywords: Crocodiles, Baboons, Sahel, Metabarcoding, Modelling.

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22103 | Natural Deep Eutectic Solvents as “tunable” green extractants for beach wrack macroalgae bioactive compounds

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Background & Aim: Natural Deep Eutectic Solvents (NADES) are an emergent group of solvents developed with the purpose of replacing commonly used ones. These new mixtures are guided by Green Chemistry principles presenting low toxicity, high biocompatibility, and availability, due to being constituted by mixes of primary metabolites [1]. Apart from these features, NADES possess the ability to be “tuned”: the addition of different amounts of water change their physical properties - allowing for higher specificity [2]. Macroalgae beach wrack is stranded seaweed washed ashore on beaches, that due to climate changes, have increased their presence worldwide. As a way of managing this currently discarded material, we aim to valorize it for crop application, based on century old usage for increased agricultural yield [3], as well as the presence of phytohormones in some algal species [4], abundant phenolic compounds and anti-oxidants. **Methods:** NADES synthesis; Extraction procedure optimization (sample/solvent ratio, extraction conditions); Physical-chemical characterization of NADES (Polarity - NileRed; pH; Viscosity; Density) **Results:** Different NADES composition (and molar ratios) affect the time and temperature the solvents require to become stable. Different water amounts change the overall properties of our solvents, making them behave distinctively (variation in extraction efficiency and extracted compounds). NADES tend to present higher density and viscosity, the lower the amount of water added. Polarity follows the opposite pattern. Different sample/solvent ratios show distinct recovery volumes. **Conclusions:** The high viscosity and density these solvents present bring on challenges when it comes to extractions, not only the possible inaccuracy of volume measurements but the low recovery rate of supernatants combine in the need of further optimization of working conditions for these solvents. However, the extraction results and physical properties show how specific the solvents can become to fulfill desired objectives, making them a worthy research topic.

Keywords: NADES, Macroalgae Beach Wrack, Plant Growth Regulators, “Green Chemistry”.

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Table 1 - List of Natural Deep Eutectic Solvents used in this project, and corresponding molar ratios

No.	NADES	Molar Ratio
1	Choline Chloride; Lactic acid	1:1
2	Choline Chloride; Malonic acid	1:1
3	Choline Chloride; Citric acid	1:1
4	Choline Chloride; 1,2-propanediol	1:1
5	Choline Chloride; Urea	1:1

22106 | Kinetics of *in vitro* cell differentiation in a 3D cardioid model generated from hPSCs

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Background & Aim: Evidence of the *de novo* generation of cardiomyocytes (CMs) in the adult myocardium left behind the idea of the heart as a post-mitotic organ. To assess the regenerative potential of the rare dividing CMs we need cell signatures to prospectively isolate these cells. Our group recently identified immunomodulatory molecule HSA/CD24 expression to assist on identifying the most immature CMs in the murine hearts, through development up to the first week post-birth [1]. To investigate whether HSA expression in the developing human heart may also be used to segregate more immature proliferative CMs, we resorted to the power of human pluripotent stem cells (hPSCs) as an unlimited source to derive CMs, and to the emerging organoids' technology. Cardioids in particular, hold potential to better emulate the embryonic microenvironment of cardiogenesis. **Methods:** Cardioids are generated driving PSCs differentiation using biphasic modulation of WNT signaling [2]. Composition and 3D cellular arrangement are assessed by flow cytometry and immunostaining; phenotypic characterization is further confirmed by transcriptomic analysis (qRT-PCR) to validate cell lineage affiliation. TEM and calcium handling techniques are used to determine the extent of CMs maturation. **Results:** We will be showing the kinetics of HSA expression on cardioids at specific time points during *in vitro* differentiation and the correlation with CMs maturation and proliferative state of the cells. **Conclusions:** We anticipate new insights on a putative role for HSA on identifying immature CMs on an *in vitro* model of human CMs differentiation.

Keywords: Cardiomyocytes Proliferation, Cardioids, Pluripotent Stem Cells.

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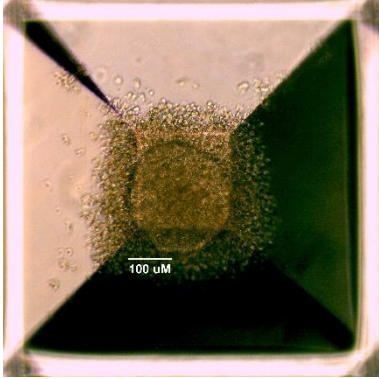


Figure 1: Optical microscopy image of cardioid at day 1 of differentiation.

22113 | Impact of wildfires on lizard diets in Portugal

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Background & Aim: In recent years, there have been significant changes in forest fire regimes, including an increase in the number of fires, their severity and the area affected. While the role of fire in the ecology and evolution of flora has been widely studied, we know little about its impact on animals, including biotic interactions. Here, we assess the impact of fire on the diet of wall lizards (*Podarcis* spp.) using a well-documented fire regime in Portugal. **Methods:** The samples (faecal pellets) were collected from lizards in recently burned sites, sites burned around 5 years ago and sites unaffected by fire. Diet was determined using a metabarcoding and high-throughput sequencing approach where a library was prepared followed by sequencing using Illumina MiSeq. **Results:** The results of this study provide us with important information on the impact of changing fire patterns in the region on small vertebrates, and also contributes with valuable information about invertebrate species' distribution. **Conclusions:** Overall, this research adds to the broader understanding of how wildfires shape ecological dynamics and provide information for conservation strategies for species affected by changing fire patterns.

Keywords: Fire ecology, Climate Change, Lizards, Diet, Portugal.

22136 | Microscopic identification of the sex and gonadal development in the axillary seabream (*Pagellus acarne*)

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Background & Aim: Fish usually do not exhibit sexual dimorphism, and reliable identification of sex and maturation status implies microscopic observation of the gonads using standard histological procedures. This situation worsens when we are dealing with protandry hermaphroditism fishes, in which the animal is born male and changes sex when it matures sexually, such a *Pagellus acarne*. **Methods:** One hundred and fifty adult individuals of *Pagellus acarne* were obtained from coastal fisheries in Portugal mainland, between April and September 2023. The identification of their sex and stage of sexual development were done using the observation of histological preparations (hematoxylin and eosin stain). **Results:** Using a routine technique, it was possible to identify the sexual gender and maturation stage of the collected specimens. It also allowed us to confirm the timing of the sex-change and the size-at-first maturity for the species. **Conclusions:** Macroscopic sex identification in fish is not an accurate tool, especially for immature fish. However, the use of histological slides is a fast and reliable process to determine the sex and maturation stage of fish, an essential information for fisheries biology.

Keywords: Histology, Fish, Size-at-first maturity, Fisheries

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CHEMISTRY

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21364 | Chemical changes underlying different tea processing methods: an overview

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Background & Aim: The tea plant, *Camellia sinensis* (L.) O. Kuntze and *C. sinensis* var. *assamica* have been used since ancient China to produce tea, which has been classified into 6 categories according to their production methods and characteristics: green, white, oolong, black, dark and yellow [1,2]. Tea processing is a determining factor of tea quality during which several chemical changes occur, resulting in different phytochemical profiles and thus, different sensory characteristics such as taste, aroma and colour [2,3]. This work aims to summarise the main steps of each tea processing and respective chemical changes. **Methods:** A search was carried out on the PubMed® database using the following key expressions “phytochemicals content in tea” “phytochemistry of camellia sinensis”, “phytochemicals tea leaves”, “tea aroma”, “yellow tea”, “black tea production”, “oolong tea processing” and “dark tea processing”. Research and review articles were considered for this work as well as References:of relevant articles. **Results:** Fermentation is a crucial process in tea production, consisting of enzymatic oxidation of catechins (flavan-3-ols) [3,4]. While green tea is non-fermented, white, oolong and black tea present ascending order of fermentation. Thus, contrary to green tea, which preserves most constituents of fresh leaves, new compounds such as theaflavins, theasinensins, thearubigins and oolongtheanins appear in fermented teas [5]. Yellow and dark teas, however, include mild (yellowing) or intense (pile fermentation or ageing) microbial fermentation steps, respectively [6,7]. Similarly, alterations in constituents such as amino acids and sugars strongly influence the quality of teas [8]. Aroma compounds are formed during processing due to the degradation of different precursor groups [9]. **Conclusions:** Tea quality characteristics are formed as a result of several factors, including the contribution of each production stage. Thus, information on the influence of processing on the chemical constitution of different teas may be useful not only for optimisation of tea processing, but also as a tool for quality assessment.

Keywords: Fermentation, Polyphenols, Flavonoids, Aroma, Tea Quality.

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21484 | Chromatographic method for the simultaneous determination of anticoagulant agents in biological samples

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Background & Aim: Anticoagulants are drugs used to prevent and treat venous thrombosis, aiming to disrupt blood clot formation. Warfarin (WAR), the most used anticoagulant, has drawbacks like a restricted therapeutic window and potential risks like cerebral bleeding, leading to the need to monitor its circulating levels to ensure the therapeutic efficacy [1]. On the other hand, the new oral anticoagulants, like dabigatran (DABI), rivaroxaban (RIVA), and apixaban (API), offer a safer alternative compared to WAR, and the implementation of therapeutic drug monitoring (TDM) is normally not required for them [2]. However, for emergency situations and specific populations, TDM is mandatory for these compounds [2]. Thus, the main goal of the work was the development of a high-performance liquid chromatography method with UV/Vis detection for the simultaneous quantification of four anticoagulant agents (API, DABI, RIVA and WAR) in different biomatrices. **Methods:** For the establishment of the chromatographic method, several parameters were studied, namely the type of column (monolithic or core-shell C18 column), mobile phase composition, injection volume, and flow rate. **Results:** Preliminary results, using an aqueous solution of formic acid (0.1%, v/v) and acetonitrile with 0.1% (v/v) of formic acid as mobile phase components, have shown that the separation of the analytes was not possible with a monolithic column due to the co-elution of API and RIVA. Nevertheless, the separation was achieved using the same mobile phase and a core-shell C18 column. Additionally, the results indicate that higher injection volumes (50 µL) can increase the sensitivity of the method. The impact of the flow rate was also evaluated, and the results show that the separation was not affected, only the retention time. **Conclusions:** The method, which is still under development, allowed the separation of the target analytes, fostering further application to different biomatrices recovered from patients under treatment.

Keywords: Anticoagulant Agents, Therapeutic Drug Monitoring, Liquid Chromatography, Analytical Development.

Acknowledgments

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21485 | Development of high-performance liquid chromatographic strategies for the analysis of polycyclic aromatic hydrocarbons using monolithic columns

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Background & Aim: Exposure to pollutants is present during all our life and represents a major threat to health. Polycyclic aromatic hydrocarbons (PAHs) are a wide group of chemicals composed by multiple fused aromatic rings arranged in many configurations, mostly released to environment as a result of combustion processes, considered priority pollutants due to their carcinogenic and mutagenic effects [1]. Their aromatic structure provides a high stability, resulting in a long-life span and potential to be transported to areas very far from the sources, being found in several environmental compartments [2] and foodstuff [3]. High-performance liquid chromatography (HPLC) coupled to fluorescence detection (FLD) has been established as one of the main techniques for PAHs analysis due to its high selectivity and sensitivity in comparison to other detection systems such as photodiode diode array, whereas monolithic columns have been gained attention for their high separation potential as compared to the conventional packed columns [4]. The main goal of this study is to develop an efficient methodology based on HPLC-FLD for the analysis of 18 target PAHs, comprising many considered in European regulations and environmental agencies, 3 deuterium-labelled and 2 methylated species for the use as internal and surrogates standards. **Methods:** In this work, operation conditions for HPLC (e.g., flow and gradients) and for FLD (excitation and emission wavelengths for each individual) were studied to achieve the best separation and detection of target PAHs, whilst different stationary phases (e.g., C18 and phenyl) were evaluated. **Results:** The use of monolithic materials in chromatographic was advantageous as allowing quick changes in flow rates, achieving high-efficiency fast separations. **Conclusions:** Due to toxicity and ubiquity of PAHs, as well as many of them being under regulation, the developed method, still under validation, will be applied for PAHs monitoring in environmental samples.

Keywords: Polycyclic Aromatic Hydrocarbons, High-Performance Liquid Chromatography, Monolithic Columns, Fluorescence Detection.

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21490 | Synthesis and structure elucidation of a tetrapeptide precursor for new marine-derived cyclic peptide

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Background & Aim: Over the years, the therapeutic potential of cyclic peptides has been exploited for a broad spectrum of biological activities, which attract attention of pharmaceutical, cosmeceutical, and nutraceutical industries [1]. This class of compounds can be obtained from natural sources, both terrestrial and marine [2]. Chemical synthesis is also a remarkable source of cyclic peptides which allows to obtain an appropriate amount of compound for further large-scale biological assays, including studies of mechanism of action, pharmacokinetics, toxicity, and others [3]. One of the aims of our group is to synthesize new marine-derived cyclic peptides for the evaluation of antimicrobial activity and further structure-activity relationship studies.

Methods: The synthesis of a tetrapeptide was performed by solution-phase synthetic strategy through coupling reactions and using a protection/deprotection *tert*-butyloxycarbonyl/methyl protecting groups methodology. The structure of the synthesized tetrapeptide was established by IR and NMR spectral analysis. **Results:** All reaction steps to obtain the tetrapeptide afforded the desired products. After purification, the structure of the cyclic peptide was elucidated.

Conclusions: The synthesis and structure elucidation of the tetrapeptide were successfully achieved. Further studies will include the total synthesis of a marine-derived cyclic peptide using the synthesized tetrapeptide as one of the precursors. We expected that the cyclic peptide will pave the way for future research to explore its antimicrobial potential and application in combating microbial resistance.

Keywords: Cyclic Peptides, Tetrapeptide, Antimicrobial Activity.

Acknowledgments

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21498 | Phenolic stability in peach purees due to pasteurization and refrigeration

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Background & Aim: Data published by the World Health Organization shows that low consumption of fruits and vegetables may be the reason for the increasing incidence of chronic diseases and could account for 14% of deaths from gastrointestinal neoplasms, 11% of deaths from coronary heart disease, and 9% of deaths from strokes [1]. One hypothesis is that vegetables and fruits contain large amounts of biologically active compounds that trigger protective effects against lifestyle-related diseases [1]. It is essential to create new products that are attractive, simple to consume, sustainable and with a balanced nutritional profile. The use of fruit purees is a strategy to promote fruit consumption at all ages. Harvest time affects characteristics such as color, sugar, organic acids, and healthy compounds due to biochemical, physiological, and structural changes during ripening, affecting the antioxidant capacity of peaches, in this case. We present here the study carried out on the phenolic stability in peach purees from a Portuguese company, considering different processing and storage conditions.

Methods: In this study, phenolic stability was assessed over time by HPLC-DAD-ESI-MS/MS [2]. Phenolic compounds were identified by HPLC-MS/MS analysis. The combination of HPLC-DAD analysis and electrospray ionization mass spectrometry allows to efficiently identify and quantify polyphenols in red peach and yellow peach extracts. **Results:** By HPLC-DAD-ESI-MS/MS, it was possible to identify 19 peaks of flavan-3-ols, procyanidins and dihydrochalcones, phenolic acids and flavonols. **Conclusions:** In this communication, the phytochemicals present in peach puree samples will be highlighted and the differences between peach species, pasteurized and unpasteurized samples will be reported and discussed. The shelf life of pasteurized samples was studied for 6 months in refrigerated and non-refrigerated conditions. These results will contribute to the quality control of peach purees under different storage conditions.

Keywords: Polyphenols, Peach Purees, Pasteurization, Refrigeration.

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21561 | Revisiting 4-Methylimidazole Levels in Balsamic Vinegars and Soy Sauces: A decade later - Unravelling Changes and Impacts

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Background and Aim: 4-Mel is a by-product of Maillard Reaction formed during the manufacturing of Caramel III and IV, which involves the interaction of ammonium compounds with carbohydrates under controlled conditions of temperature and pressure. These two types of ammonia caramels are the most produced caramel colouring agents, typically used in cola drinks, dark beers, processed sauces and balsamic vinegars. The main problem of the presence of 4-Mel in foodstuffs containing E150c or E150d is its carcinogenic property, especially at concentrations of 50 and 700 ppm. The EU has established a maximum level of 4-Mel for E150c and E150d, opposite no limit amounts were settle for foodstuffs, thus, the safety authorities must guarantee that the human dietary intake is within acceptable limits. Therefore, our aim is to evaluate if has been a decrease in the level of 4-Mel in condiment sauces and balsamic vinegars compared to those that existed 10 years ago. **Methods:** An ion-pair extraction with bis-2-ethylhexylphosphate and derivatization with isobutylchloroformate followed by CG-MS method was performed in order to quantify 4-Mel in processed sauces and balsamic vinegars. The quantification method used was the internal standard calibration curve, being the 2-ethylimidazole as IS. Samples were collected from various brands containing caramel in the ingredients list. **Results:** The preliminary results indicated concentrations values below 1.4 mg/kg of 4-MEI in the samples analysed. **Conclusions:** Relative to levels recorded a decade ago, concentrations remain either equal or have shown a notable decrease. This positive trend suggests that efforts in manufacturing practices or ingredient selection may have contributed to improved consumer safety regarding 4-MEI exposure in these condiments over the past decade. Continued vigilance, monitoring, and adherence to evolving standards are essential to ensure sustained progress in enhancing the safety profile of processed sauces.

Keywords: 4-Methylimidazole, Balsamic Vinegars, Soy Sauces, Decadal Changes, Gas Chromatography -Mass Spectrometry Method, Ion-Pair Extraction.

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21574 | Design and synthesis serine-derived gemini surfactants for RNA delivery

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Background & Aim: Although revolutionary in many ways, gene delivery-based therapeutics still faces some issues, mainly: the in vivo extreme instability of genetic material, their low cellular uptake, and the poor efficiency in translation [1]. To overcome this, the assistance by vectors in gene delivery is required. Cationic surfactants have proved to be highly promising in delivering genetic material to cells. However, they exhibit high levels of cytotoxicity which is detrimental to their use in biomedical applications. In the last two decades, considerable efforts have been made to synthesize novel surfactants, possessing enhanced toxicological profiles, by inclusion of natural synthons (such as amino acids) into their molecular structure. Our research team has been engaged in the synthesis and evaluation of the physicochemical and biological properties of serine-based surfactants. Different families of serine-based gemini surfactants were shown to exhibit promising liposome-forming properties being efficient in DNA compaction and gene transfection [2,3]. **Methods:** The reactions used throughout the synthetic methodologies were: acylations, reductive aminations, condensations with peptide coupling agents and exhaustive methylation. The reactions and purifications were followed using thin layer chromatography (TLC). For the isolation and purification of the desired compounds, various techniques were employed such as: liquid-liquid extraction, recrystallization and column chromatography. The characterization of the compounds obtained was done by proton nuclear magnetic resonance (¹H-NMR) and mass spectrometry. **Results:** The target compounds of the amide-ester series were obtained in good yields. Additionally, the synthesis of another novel family of serine surfactants is under development. **Conclusions:** The best synthetic methodologies for the obtention of a novel family of serine-derived gemini surfactants were established and optimized.

Keywords: Surfactants, Amino Acids, Organic Synthesis, Gene Delivery.

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21578 | Ultrasound assisted extraction with ionic liquids as a greener method for gallic acid extraction from grape seeds

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Background & Aim: Aqueous solutions of ionic liquids (ILs) are potential substitutes for traditional organic solvents in the extraction of bioactive compounds, as they act as hydrotropes or surfactant agents that increase the solubility of these compounds [1]. ILs are considered a green alternative as they do not emit polluting vapours and can be recovered at the end of extraction [2]. Furthermore, it is possible to combine different cations and anions to obtain ILs with desired target properties. Thus, with the aim of optimizing the extraction of gallic acid from harvest vineyards wastes, the conductor-like screening model for real solvents (COSMO) [3] was applied to identify the most promising ILs for the study. **Methods:** Initially, extractions were carried out with commercial ILs composed of imidazolium cation and acetate, tosylate or chloride anion, in 0.1 M and 3.0 M aqueous solutions. 5 mL of the solution was added to 250 mg of grape seeds (500-355 µm), and extraction assisted by ultrasound for 15, 30, 45 and 60 minutes was made. **Results:** After analysing the samples in UHPLC-UV, it was observed that increasing the ultrasound assisted extraction (UAE) time generated an increase in the extraction efficiency of gallic acid for most ILs and concentrations. Also, it was observed that the IL with imidazolium and chloride was the one that extracted the most gallic acid. **Conclusions:** Increasing the UAE time can break the cellular matrix and favour the dissolution of gallic acid present in it, in addition to the temperature increase and the solutions viscosity decrease. High viscosity may be the explanation for why more concentrated solutions of ILs (3.0 M) did not extract proportionally more gallic acid [1,4]. Therefore, among the conditions tested in this work, we can state that UAE for 60 minutes with lower concentrations of ILs are more advantageous as they involve lower costs and generate satisfactory results in terms of the mass of gallic acid extracted.

Keywords: Ionic Liquids, Gallic Acid, Valorization, Ultrasound Assisted Extraction.

Acknowledgments

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21621 | Binding studies of a series of synthetic cannabinoids to human serum albumin by high-performance affinity chromatography

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Background & Aim: Synthetic cannabinoids are a diverse group of new psychoactive substances (NPS) that primarily interact with the endocannabinoid system, which is involved in many physiological functions. They are one of the fastest proliferating class of NPS posing a higher health issue concern. Numerous reports of severe morbidity and mortality have emerged related to the consumption of synthetic cannabinoids [1]. Studies of toxicodynamics and toxicokinetics of synthetic cannabinoids are pivotal to increase the knowledge of this class of NPS. To our knowledge, studies of the interaction of synthetic cannabinoids with human serum albumin (HSA), the most abundant plasma protein, are still very limited [2]. This work aims the evaluation of binding affinity of a series of synthetic cannabinoids by high-performance affinity chromatography (HPAC). HPAC is a very useful and efficient technique to study intermolecular interactions between HSA and drugs [3,4]. **Methods:** The interaction of synthetic cannabinoids with HSA was investigated by HPAC by zonal elution experiments for measuring the retention times of each cannabinoid on an HSA column. Mixtures of potassium phosphate buffer (67 mM, pH 7.0) and acetonitrile were used as mobile phases in reversed elution mode. **Results:** The binding percentages (%*b*) values ranged from 94 to 99%. ADB-FUBINACA and AMB-FUBINACA (MMB-FUBINACA) showed the highest binding affinity both with a %*b* of 99%. **Conclusions:** The synthetic cannabinoids bounded to HSA with high affinity, which can interfere with drugs pharmacokinetics by increasing their free fraction in blood, as result of their displacement from albumin or even by saturation of this protein. Further studies will include zonal displacement chromatography studies, using competitors with known specific binding sites on HSA, to shed light on the sites where the selected cannabinoids bind to HSA.

Keywords: Synthetic Cannabinoids, Human Serum Albumin, High-Performance Affinity Chromatography, Binding Affinity.

Acknowledgments

This research was supported by national funds through FCT within the scope of Base Funding UIDB/04423/2020 and UIDP/04423/2020 (Group of Marine Products and Medicinal Chemistry - CIIMAR).

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21643 | Automatic assessment of Cathepsin G enzyme activity in wound infection

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Background & Aim: Wound infection poses significant challenges in the healing process, compromising diagnosis and treatment. Neutrophil activity increases during infection, leading to the secretion of proteolytic enzymes like Cathepsin G (Cat G) in wound fluids. High Cat G activity persists in non-healing wounds, causing degradation of reconstituted tissue and infection. Thus, the monitorization of its value is important to evaluate the condition of the wound and further treatment [1]. This study aims to develop an automatic system based on sequential injection analysis (SIA) to evaluate Cat G activity. **Methods:** SIA system is an automated, miniaturized, and rapid analytical tool with low reagent consumption, minimal waste generation and decreasing operator intervention, advantages that improve reproducibility and reduce operation costs [2]. The enzymatic reaction is based on the cleavage of the Cat G substrate (N-succinyl-Ala-Ala-Pro-Phe-p-nitroanilide) to p-nitroaniline (pNA), which can be measured by spectrophotometry at 405 nm [1]. To optimize the reaction, parameters such as reagent concentration and volume, flow rate, aspiration order, temperature, and reaction time, were evaluated in a univariate approach [2, 3]. **Results:** Univariate optimization determined the optimal parameters to maximize accuracy and quickness in executing the enzymatic reaction assay. The study of reaction time made it possible to find a compromise between the time spent on the test and the analytical signal obtained. Furthermore, evaluating the impact of temperature on the reaction proved advantageous regarding signal intensity and reaction time. The developed methodology presented detection and quantification limits of 0.0008U/mL and 0.0026U/mL, respectively, allowing the precise Cat G concentrations assessment. **Conclusions:** Future work involves the application of the developed SIA system to real samples of infected wounds and the evaluation of possible inhibitors of Cat G.

Keywords: Wound Infection, Cathepsin G, Automation, Sequential Injection.

Acknowledgments

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21648 | DNA-Functionalized Gold Nanoparticles For Detecting Mutations Associated With Non-Small Cell Lung Cancer

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Background & Aim: Cancer is among the leading causes of global mortality, emphasizing the urgent need for swift and accurate diagnosis. Gold nanoparticles (AuNPs) exhibit promise in biodetection owing to their size and unique optical properties, including Local Surface Plasmon Resonance (LSPR)¹. This study aims to optimize a rapid and reliable detection assay utilizing AuNPs to identify a common mutation occurring in exon 19 of the epidermal growth factor receptor (EGFR), associated with non-small cell lung cancer cells. **Methods:** AuNPs were synthesized via the citrate-reduction method² and functionalized with thiolated oligonucleotides (16 bp) by a pH-assisted method³ to create Au nanoprobcs. Characterization involved UV-Vis spectrophotometry and dynamic light scattering (DLS) to assess size dispersion and ζ -potential (colloidal stability). Optimization of the detection assay entailed determining the ideal oligo-to-AuNP ratio and salt concentration for aggregation. Subsequently, nanoprobcs were incubated with synthetic target DNAs, either mutated (complementary), normal (partially complementary), or noncomplementary DNA, to observe hybridization under varying conditions. Detection was based on color change, indicative of the aggregation state. **Results:** Preliminary findings indicate progress in narrowing down the range for the oligo-to-AuNP ratio, a crucial parameter in the detection assay optimization process, thereby laying the groundwork for further refinement of the assay's parameters. The observed color changes from red to blue, indicative of aggregation, under specific conditions of DNA and salt concentration, provide promising insights into the assay's efficacy. **Conclusions:** This study presents a promising avenue for the rapid, cost-effective detection of non-small cell lung cancer-related DNA mutations. By refining AuNP-based detection assays, this research contributes to the development of a potential platform for early diagnosis, thereby addressing a critical need in cancer management.

Keywords: Gold Nanoprobcs, Biosensors, DNA Detection, Lung Cancer.

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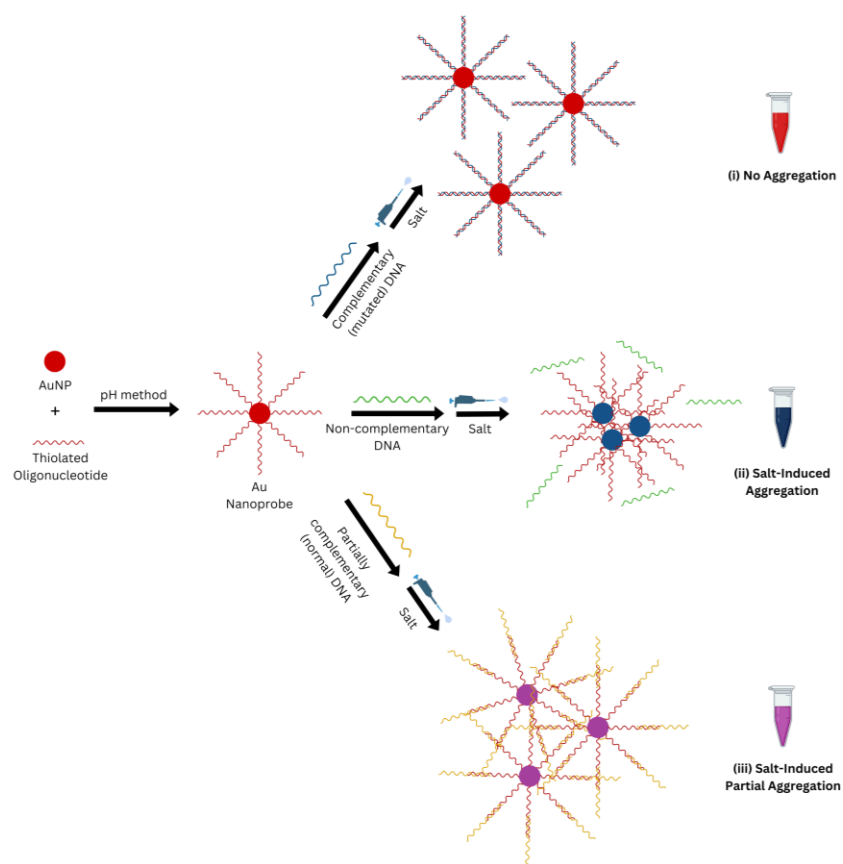


Figure 1: Detection assays using selective aggregation of gold nanoparticles in the presence of target DNAs: (i) complementary (mutated DNA); (ii) non-complementary; and (iii) partially complementary (normal DNA), upon the addition of salt.

21658 | Efforts Towards the Development of a Chemosensor for Chiral Amino Acid Detection: Synthesis and Structural Characterization of a Xanthone-based Derivative

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Background & Aim: D-amino acids perform a vital role in all biological functions namely in the central nervous system in brain synapses and cognitive functions. The dysregulation of D-amino acid metabolism has been associated with some neurological and neurodegenerative disorders. Alzheimer's disease (AD) is an example and recent studies have showed that there is a correlation between the increased of D-serine levels with the progression of AD in the early stages of the disease [1]. This illness is characterized as a progressive disease that causes dementia at long-term affecting severely patients' quality of life. Hence, altered D-amino acids levels in early stages of the disease constitute specific and sensitive biomarkers for early diagnoses and treatment. Herein, we present our research efforts towards the synthesis of a chemosensor based on a xanthone fluorophore linked to a chiral moiety that could quantify and recognize enantioselectivity D-aa and D/L amino acids ratio for AD diagnosis. **Methods:** The synthetic strategy developed considered an aromatic nitration of the xanthone followed by the reduction of the nitro group to yield an aminoxanthone. A maleimide moiety, required for the chiral unit coupling, was added. The final reaction step to obtain the sensor featuring a chiral component considers the coupling between the aminoxanthone and the proline moiety. **Results:** The synthesis of the amino and maleimidexanthones were successfully achieved and all the synthesized products were purified and structurally characterized by Nuclear Magnetic Resonance and Infrared spectroscopy. Studies towards the addition of L-proline, as chiral moiety, to the maleimidexanthone were performed using different reaction conditions and the product purification and structural characterization are ongoing. **Conclusions:** Synthesis of the

nitro-, amino-, and maleimidexanthone intermediates were successfully achieved. Preliminary results towards the addition of the chiral L-proline to the maleimidexanthone will be presented.

Keywords: Enantioselectivity, Chemosensor, Xanthone Derivatives, Chiral Amino Acids.

Acknowledgments

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21735 | Energetic Study of Two Carbamazepine Polymorphs

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Background & Aim: Carbamazepine (CBZ, structural formula in Figure 1) is a compound frequently used in the pharmacological treatment of convulsive disorders and neuropathic diseases [1]. This compound exhibits five polymorphic forms, four of them being already experimentally identified, although the literature information concerning the inherent energetic properties is very scarce. The aim of this work is to provide an energetic characterization of two of the polymorphs of CBZ, contributing to understand the corresponding energetic-structural effects. **Methods:** The study began with the purification of the sample, followed by the characterization of the two polymorphic forms using Gas Chromatography (GC) and Fourier Transform Infrared Spectroscopy (FTIR). Subsequently, thermodynamic properties were determined by Differential Scanning Calorimetry (DSC) and Combustion Calorimetry. **Results:** Two polymorphic forms of CBZ, namely polymorph I (triclinic) and polymorph III (C-monoclinic), have been identified according to data reported in the literature [2-4]. Furthermore, the fusion temperature, the enthalpy of fusion, and the enthalpy of combustion of the two polymorphs were determined, thereby enhancing the knowledge on the energetic properties of CBZ. **Conclusions:** The present study provides the identification and characterization of an enantiotropic pair of polymorphs of CBZ, as well as the determination of energetic properties, namely the fusion point, the enthalpy of fusion and the enthalpy of combustion. This research provides new insights into the polymorphism exhibited by crystalline CBZ, allowing a new knowledge on energetic properties of the triclinic and C-monoclinic polymorphs.

Keywords: Carbamazepine, Polymorphism, Thermodynamics, Enantiotropism.

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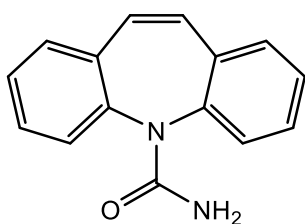


Figure 1: Structural formula of Carbamazepine.

21755 | Upcycling PET waste into innovative supramolecular structures

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Background & Aim: The massive accumulation of plastic waste poses a significant environmental challenge globally. Plastic pollution affects ecosystems through soil, marine, and air pollution, leading to adverse effects on biodiversity and climate change. PET (polyethylene terephthalate) bottles found in the oceans are a significant contributor to the ecological problem of plastic waste accumulation, with studies showing that PETs can remain robust for approximately fifteen years before significant degradation occurs [1]. Efforts to reduce plastic pollution, promote recycling, and develop sustainable alternatives are essential to address the persistent problem of plastic waste in oceans and ecosystems [2]. The main objective of this research is to explore sustainable and efficient methodologies for hydrolysing PET waste into terephthalic acid (TPA) and utilizing it as a ligand in the creation of supramolecular structures for applications in biomedical devices and sensors (Figure 1). **Methods:** The hydrolysis of PET was studied under alkaline conditions (NaOH aqueous solution), using three heating methodologies: conventional, microwave, and ohmic heating. **Results:** While all tested heating methodologies allowed a good conversion of PET into TPA, ohmic heating has been highlighted as the most energetically efficient process. Ohmic heating not only increases reaction rates but also enables the reuse of the alkaline solution for several reaction cycles, thereby minimizing the environmental impact of the process. The creation of supramolecular structures involved combining TPA obtained from PET with 4-(dimethylamino)pyridine (DMPA), using methanol as a solvent, under low-temperature crystallization conditions. This method resulted in the development of angular crystals, which were analyzed using X-ray crystallography and Fourier-transform infrared spectroscopy (FTIR). The analysis revealed a three-dimensional supramolecular arrangement characterized by hydrogen bonds between TPA and DMPA units. **Conclusions:** Ohmic heating stands out for its energy efficiency and sustainability in the hydrolysis of PET compared to conventional and microwave heating methods. From the recycled TPA, it is possible to create new advanced materials for future integration into devices and sensors.

Keywords: Polyethylene Terephthalate Hydrolysis, Ohmic Heating, Recycled Terephthalic Acid, Advanced Materials.

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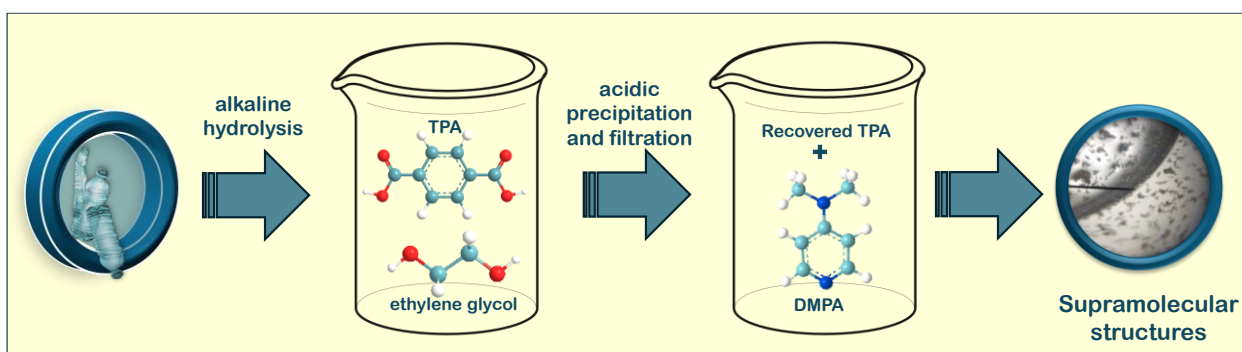


Figure 1: Approach proposed for upcycling PET waste into innovative supramolecular structures.

21768 | [Click on Click: Development of functionalized polymersomes encapsulating promising anti-cancer small molecules](#)

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Background & Aim: Globally, about 189000 people die yearly because of brain cancers, of which the glioblastoma (GBM) is the most common and aggressive form [1]. Chemotherapy is difficult due to the efficacy of the Blood Brain Barrier (BBB), hindering drug absorption into the brain [2]. Flavonoids are a class of polyphenolic compounds that can be found in nature [3]. In our group, synthetic flavonoids have been proved to have anti-proliferative activity on GBM cell lines [4,5]. In this work, our aim was to synthesize a flavone triazole linked with glucose through click chemistry reaction (CuAAC: copper-catalysed alkyne-azide cycloaddition) [6] and encapsulate in polymersomes (PMs) functionalized also by CuAAC, for localized drug delivery. **Methods:** PMs functionalized with azide were prepared by solvent displacement method mixing different proportions of polyethylene glycol-poly(lactic acid) (PEG-PLA) and Azide-PEG-PLA: 20 mg/mL of PEG-PLA and Azide-PEG-PLA in the organic phase were mixed into the aqueous phase. Following, it was necessary to introduce the azide and alkyl groups on the respective building blocks, glucose, and flavone, respectively. The 3,7-di-hydroxyflavone (1) was modified with propargyl bromide to give 3,7-(prop-2-yn-yloxy) flavone (2) after a column chromatography with 8:2 Hex–AcOEt. Acetobromo- α -D-glucose (3) was modified with sodium azide to provide 2,3,4,6-tetra-O-acetyl- β -glucopyranosyl azide (4). **Results:** PMs preparation was successful, providing nanoparticles with circa 130 nm of diameter. Compounds 2 and 4 were successfully synthesized and purified. **Conclusions:** The obtention of PMs was achieved and the synthesis of the building blocks for the synthesis of the flavone linked with glucose were successful. Two CuAAC reactions are now on-going: one to “click” compounds 2 and 4, other to “click” propargylated hyaluronan to the nanoparticles allowing the delivery to GBM. In the future, antitumour activity of empty and loaded PMs with the synthetic flavone will be tested and compared.

Keywords: Click, Glioblastoma, Flavones, Polymersome.

Acknowledgments

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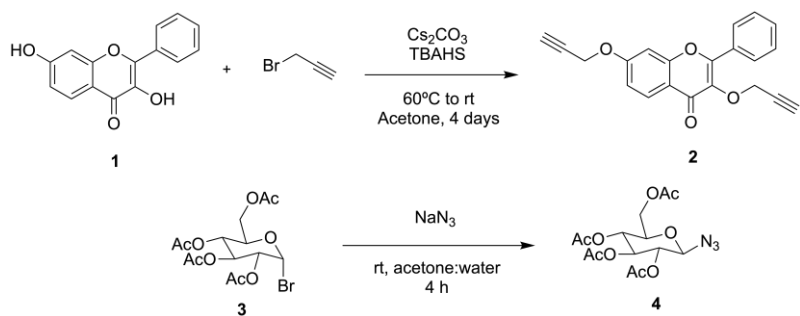


Figure 1: Scheme of the synthesis of the two moieties for glycosylation through click chemistry. On top: Synthesis of the 3,7-(prop-2-yn-yloxy) flavone (**2**). Below: Synthesis of 2,3,4,6 tetra-*O*-Acetyl- β -glucopyranosyl azide (**4**).

21937 | Probing the Assembly of Fluorescent Glypromate-Based Conjugates

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Background & Aim: Glycyl-L-prolyl-L-glutamic acid (Figure 1), also known as Glypromate, is an endogenous neuropeptide obtained from the enzymatic cleavage of the insulin-like growth factor-1 found in brain tissues. Biologically, this neuropeptide displays neuroprotective activity with the potential to treat neurodegenerative diseases and other neurological conditions. However, its underlying mechanisms of action remain unknown.[1] The aim of this work is the conjugation of Glypromate neuropeptide and other Glypromate derivatives with relevant fluorophores to aid the investigation of the underlying neuroprotection mechanisms and intracellular distribution of these compounds.[2] **Methods:** Glypromate and Glypromate derivatives are prepared by either classical step-by-step peptide synthesis protocols in solution-phase or using one-pot protocols developed in our research group.[3] Next, the conjugation of peptide motifs with fluorophores is performed by peptide coupling at the *N*-terminal position through a peptide bond. Then, the fluorescence of the Glypromate-based conjugates is characterized, and their cytotoxicity is evaluated using differentiated human SH-SY5Y neuroblastoma cells. In addition, preliminary studies by fluorescence microscopy are envisioned to assess cellular internalization. **Results:** The synthesis of Glypromate-based peptides proved to be very effective, affording the desired peptides in high global yields. Conjugation of Glypromate-based peptides with the selected fluorophores delivered, for the first time, Glypromate-based fluorescent conjugates. Currently, fluorescence characterization and cell-based studies are ongoing. **Conclusions:** The development of Glypromate-based fluorescent conjugates is unprecedented. The research herein disclosed is expected to push forward the state of the art of Glypromate research by providing useful insights into the underlying neuroprotective mechanisms and intracellular targets of Glypromate and structure-related compounds.

Keywords: Glypromate Neuropeptide, Fluorophores, Fluorescence Microscopy, Neuroblastoma Cells.

Acknowledgments

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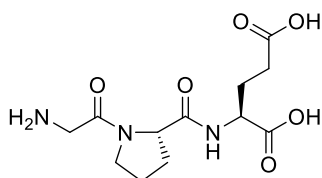


Figure 1: Structure of Glypromate neuropeptide.

21951 | Study of drug-membrane interactions in liposome systems

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Background & Aim: Liposomes are vesicles formed by one or more phospholipid bilayers oriented concentrically around an aqueous compartment that approximate the composition of membranes *in vivo*. Hence, they are versatile biomimetic models that can be used to evaluate the efficacy of drugs. By making changes to the lipid structure such as membrane curvature or fluidity, drugs can regulate the location and activity of membrane proteins. So, they are appropriate tools to profile new drug candidates in terms of lipophilicity, permeability, toxicity, transport mechanisms and pharmacological activity [1-3]. This work is part of a project that aims to synthesize chelators, derived from 3-hydroxy-4-pyridinones (3,4-HPOs) to improve the therapeutic potential of (V and Zn) to act as antidiabetic drugs for oral administration [4,5].

Methods: The chelator 4 was synthesized using a three-step sequence as described in figure 1. The interaction of chelator 4 with DMPC liposomes was investigated by DSC. DMPC liposomes exhibit a characteristic thermal behaviour by heating, showing a sharp endothermic gel to liquid crystal transition whose peak temperature, shape, and enthalpy are strongly affected by interactions with other substances, thus reflecting the changes induced in the bilayer structure.

Results: The chelator synthesis was accomplished successfully, and the compound's structure was confirmed through analysis using NMR. Preliminary DSC results shows that the chelator interacts with the lipid membrane, affecting the transition temperature T_m . Experiments are currently in progress to validate and confirm this result. **Conclusions:** The bioavailability and efficacy of drugs are strongly determined by drug-membrane interactions. Thus, studies of these interactions are important to determine pharmacokinetic properties and to elucidate its action and toxic mechanisms. Ultimately such studies may prove valuable in the design of novel drugs formulations with increased efficacy and reduced side effects.

Keywords: DMPC liposomes, Drug-membrane interactions, 3,4-Hydroxypyridinones chelators, Differential Scanning Calorimetry.

Acknowledgments

L.M.P.F.A. thanks FCT/MCTES funding through the Individual Call to Scientific Employment Stimulus 2018 (CEECIND/03202/2018) DOI 10.54499/CEECIND/03202/2018/CP1545/CT0001

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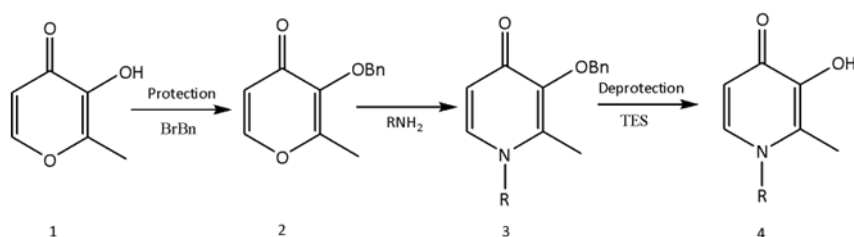


Figure 1: Synthesis of chelator 4

21963 | Synthesis and Biological Evaluation of Novel Glypromate Conjugates with Bioactive Amines for Application in Neurodegenerative Diseases

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Background & Aim: Glypromate (glycyl-L-prolyl-L-glutamic acid, GPE) is an endogenous neuropeptide widespread in the brain that holds great potential to tackle neurodegenerative diseases, such as Parkinson's (PD) and Alzheimer's (AD).¹ However, the clinical application of this short neuropeptide is hindered due to its poor pharmacokinetic properties.¹ In this sense, a new series of GPE derivatives was designed by exploring the chemical conjugation of GPE and a bioactive GPE analogue bearing L-pipecolic acid as a proline surrogate with bioactive amines, such as amantadine, memantine, and (*R*)-1-aminoindane. In this work, an unprecedented library composed of 36 conjugates was synthesized and biologically evaluated. **Methods:** For the assembly of all the GPE-based conjugates, a sustainable and chemoselective one-pot methodology was employed.² Cytotoxic evaluation was carried out in non-differentiated and differentiated (dopaminergic phenotype) SH-SY5Y neuroblastoma cells (MTT reduction assay). The ability to reduce the protein aggregation induced by A β ₂₅₋₃₅ was evaluated in non-differentiated SH-SY5Y cells, quantified by the thioflavin T assay. Neuroprotection against the neurotoxicant 6-hydroxydopamine (6-OHDA) was assessed in differentiated SH-SY5Y cells (MTT reduction assay). **Results:** In this series, the pipecolic acid-based conjugates were found to induce high cytotoxic effects. Among prolyl-based GPE conjugates, five of them were able to significantly counteract the cytotoxic elicited by 6-OHDA, with one conjugate demonstrating a 2.3-fold improvement in neuroprotective effect compared to GPE. Six compounds were able to significantly reduce the protein aggregation induced by A β ₂₅₋₃₅ up to 43%, showing a superior neuroprotective profile when compared to GPE (13%). **Conclusions:** The conjugation strategy of

GPE with API herein disclosed led to the discovery of bioactive conjugates with biased biological responses and superior biological performance in comparison with the parent neuropeptide.

Keywords: Glypromate, Peptide Conjugates, Neurodegenerative Diseases.

Acknowledgments

This work received financial support from PT national funds (FCT/MCTES, Fundação para a Ciência e a Tecnologia and Ministério da Ciência, Tecnologia e Ensino Superior) through Project 2022.01175.PTDC (DOI: 10.54499/2022.01175.PTDC). FCT is also acknowledged for supporting Projects UIDB/50006/2020 (DOI: 10.54499/UIDB/50006/2020), UIDP/50006/2020 (DOI: 10.54499/UIDP/50006/2020), and UIDB/04378/2020 (DOI: 10.54499/UIDB/04378/2020) and Project LA/P/0140/2020 (DOI: 10.54499/LA/P/0008/2020) of i4HB. I.E.S.-D. and S.C.S.-R. thank FCT for funding through the Individual Call to Scientific Employment Stimulus with Grant 2020.02311.CEECIND/CP1596/CT0004 (DOI: 10.54499/2020.02311.CEECIND/CP1596/CT0004) and Ph.D. grant SFRH/BD/147463/2019, respectively. X.G.-M. thanks Xunta de Galicia for financial funding with reference GPC2020/GI1597.

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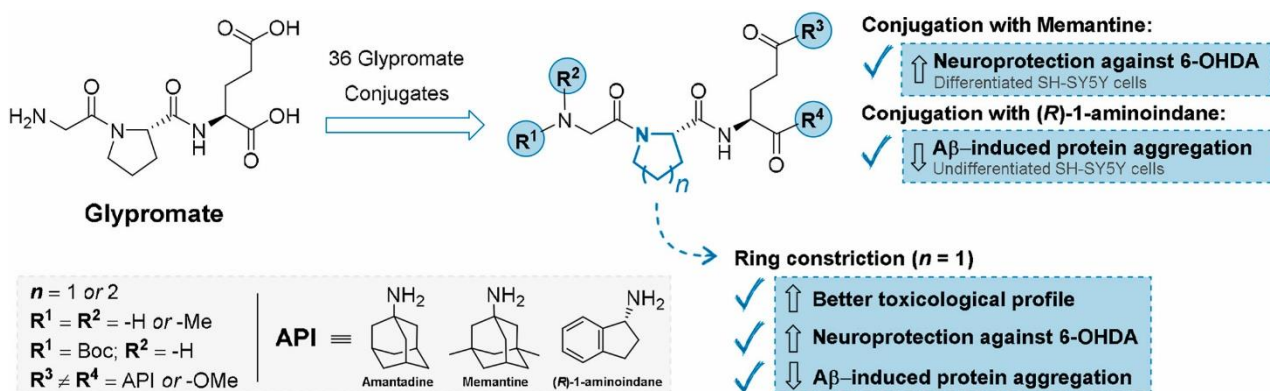


Figure 1: Structures of GPE and novel GPE-based conjugates with API, including a summary of the main structure-activity relationship data from neuroprotection, protein aggregation, and toxicological profiles.

21993 | Eco sustainable PET plastic waste depolymerization

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Background & Aim: The modern world undoubtedly faces several problems, one of which is plastic, more specifically when it's not reused. In the EU, around 1.5 million tons of new PET [poly(ethylene terephthalate)] bottles are produced every year, with only a total of 48% being reused and the remaining ones ending up contaminating the environment and contributing to the current climate crisis [1]. The current lack of sustainable methodologies for PET depolymerization is a major challenge for PET waste conversion into valued products [2]. Our focus was the depolymerization of PET through biomimetic methods (methods based on natural processes) and in this work we explored biomimetic catalysts such as positive and negative Fe(III) porphyrins (tetrapyrrolic macrocycles with an iron ion centre), which are analogous to the active centre of redox enzymes. **Methods:** The PET reductive depolymerization reactions have been carried out using NaBH₄ as a reducing agent, in the presence of metalloporphyrins as catalysts and under microwave heating (80-120°C). The reactions have been monitored by Fourier-transform infrared spectroscopy (FTIR) and nuclear magnetic resonance (NMR) to verify their performance in different conditions. **Results:** It was observed the formation of 1,4-benzenedimethanol and ethylene glycol. The former is an organic compound of great importance for the preparation of other materials including sensors and heterogeneous catalysts. **Conclusions:** One of the main values of this work is undoubtedly the energy saving, since in the conventional PET degradations extremely high temperatures are used (200-950°C), while in the present conditions 80-100°C were used in the microwave reactor. This represents a more economical and sustainable methodology endeavouring a PET circular economy.

Keywords: Polyethylene Terephthalate, Depolymerization, Microwave Heating, Biomimetic Catalysis.

Acknowledgments

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10.54499/UIBP/50006/2020 and UIDB/50006/2020 DOI 10.54499/UIDB/50006/2020, funded by FCT/MCTES (Fundação para a Ciência e Tecnologia/Ministério da Ciência, Tecnologia e Ensino Superior). S.L.H. Rebelo thanks FCT for funding through program REQUIMTE/EEC2018/30.

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22061 | Replacement of Picolinic Acid by Pyrazinoic Acid in Melanostatin

Peptidomimetics

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of Porto, Porto, Portugal¹

Background & Aim: Melanostatin (MIF-1), formally known as L-prolyl-L-leucylglycinamide, is an endogenous neuropeptide that acts as a positive allosteric modulator (PAM) of the dopamine D₂ receptors (D₂R), denoting potential application in Parkinson's Disease (PD). Despite its potent PAM activity, MIF-1 exhibits pharmacokinetic drawbacks such as low gastrointestinal absorption and reduced metabolic stability.[1-3] Previous studies of our research group using picolinic acid (Pic) as an L-proline (Pro) surrogate led to the discovery of a MIF-1 analogue with improved PAM activity in comparison with the parent neuropeptide.[1] To better understand the role of pyridine derivatives on PAM activity, a small library composed of four MIF-1 derivatives was envisioned using pyrazinoic acid (Pyraz) as a Pic surrogate. **Methods:** The C-terminal dipeptides are synthesized by coupling *N*-Boc-protected valine with C-terminal residues (glycine or L-alanine methyl esters), followed by the removal of the *N*-Boc-protecting group. Next, C-terminal dipeptides are coupled with pyrazinoic acid, followed by ammonolysis. Both ester and amide tripeptidomimetics will be tested for their ability to modulate the activity of D₂R through functional assays measuring the mobilization of cAMP and determining their toxicological profiles in human SH-SY5Y cells. **Results:** The synthesis of the new Pyraz-based derivatives of MIF-1 was accomplished with good overall yields. Moreover, *in silico* blood-brain (BB) permeation experiments showed that the replacement of Pro by Pyraz enhanced the BB permeation (BB ratio of 0.990) which compares favorably with the parent neuropeptide (BB ratio of 0.847). **Conclusions:** These new Pyraz-based derivatives of MIF-1 are expected to provide useful structure-activity information for the rational design of potent PAMs of D₂R, paving the way for the development of new anti-Parkinson hits.

Keywords: Picolinic Acid Derivatives, Pyrazinoic acid, Melanostatin Neuropeptide, Parkinson's Disease.

Acknowledgments

This work received financial support from PT national funds (FCT/MCTES, Fundação para a Ciência e a Tecnologia and Ministério da Ciência, Tecnologia e Ensino Superior) through Project 2022.01175.PTDC (DOI: 10.54499/2022.01175.PTDC). FCT is also acknowledged for supporting Projects UIDB/50006/2020 (DOI: 10.54499/UIDB/50006/2020), UIDP/50006/2020 (DOI: 10.54499/UIDP/50006/2020), and UIDB/04378/2020 and Project LA/P/0140/2020 (DOI: 10.54499/LA/P/0008/2020) of i4HB. I.E.S.-D thanks FCT for funding through the Individual Call to Scientific Employment Stimulus with Grant 2020.02311.CEECIND/CP1596/CT0004 (DOI: 10.54499/2020.02311.CEECIND/CP1596/CT0004). B.L.P.-L. thanks FCT for the Ph.D. grant 2022.14060.BD.

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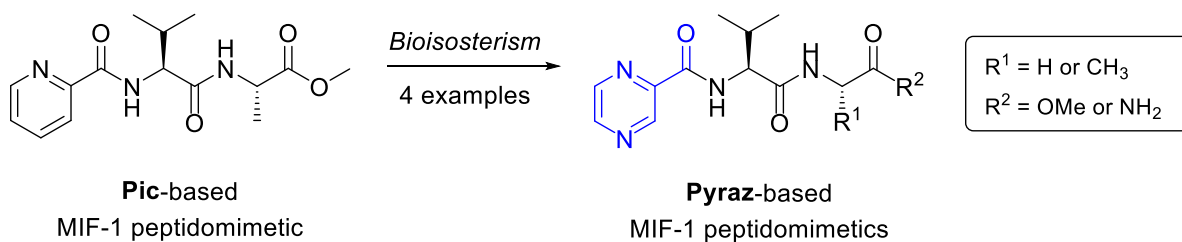


Figure 1: Structures of the biologically active Pic-based MIF-1 derivative and the Pyraz-based MIF-1 derivatives described in this work.

22071 | Initial steps into the synthesis of a hydrophilic siderophore mimetic for the removal of heavy metals in wastewater

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Background & Aim: Siderophores are small molecules of organic nature secreted by microorganisms to chelate and transport Fe(III) to the cytoplasm [1]. Beyond iron, siderophores can chelate with other metals, including divalent heavy metals and actinides, that are toxic to the environment. The potentially high metal-siderophore stability constants form soluble metallophores (metal-siderophore complexes) [2], significantly influencing the fate and transport of metal contaminants. **Methods:** This work aims to synthesize a catecholate-type siderophore mimetic to be further incorporated into phase inversion-based filtration membranes to enable the chemisorption of the metals present in the wastewater samples during filtration [3]. To prevent leaching during the nonsolvent-induced phase inversion process, a siderophore mimetic with an alkyl chain was chosen due to its chemical properties, which enhance the lipophilicity of the siderophore, thereby maintaining its presence within the polymeric membrane structure. **Results:** The first step was the synthesis of *N,N'*-(((2-palmitamidoethyl)azanediyl)bis(ethane-2,1-diyl))bis(2,3-dihydroxybenzamide) (Scheme 1), which consisted in the amidation reaction of palmitic acid with tris(2-aminoethyl) amine in the presence of triethylamine to obtain the desired *N*-(2-(bis(2-aminoethyl)amino)ethyl)palmitamide. The product of the reaction was characterized by Infrared Spectroscopy, which confirmed the amidation reaction. Future work includes the synthesis of *N,N'*-(((2-palmitamidoethyl)azanediyl)bis(ethane-2,1-diyl))bis(2,3-dihydroxybenzamide) and further incorporation of the siderophore in polysulfone membrane, which will be prepared by spin-coating. The membranes will also be characterized concerning their siderophore contents, porosities, and maxima water flow and their metal absorptions will be analysed in static and dynamic conditions. **Conclusions:** This approach can be effectively used to remove toxic metals from wastewater, which pose serious health threats.

Keywords: Siderophores, Membranes, Heavy Metals.

Acknowledgments

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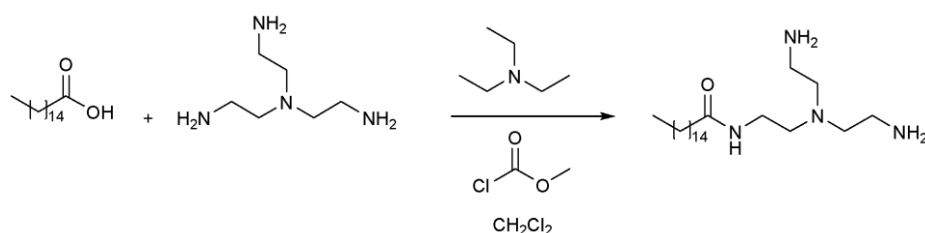


Figure 1: Synthesis of N-(2-(bis(2-aminoethyl)amino)ethyl)palmitamide.

Neuropeptide

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Background & Aim: Melanostatin (MIF-1), is an endogenous neuropeptide derived from the cleavage of oxytocin hormone that acts as a positive allosteric modulator (PAM) of the dopamine D₂ receptors (D₂R), being potentially relevant in Parkinson's Disease therapy. Despite its potent PAM activity, MIF-1 exhibits low gastrointestinal absorption and reduced metabolic stability.[1-3] L-Proline (Pro) residue is widely acknowledged for its tolerability to chemical derivatizations, rendering several potent MIF-1 analogues.[1-3] Previous studies developed by our research group using heteroaromatic scaffolds led to MIF-1 analogues with improved PAM activity in comparison with the parent neuropeptide.[1-3] In order to get deeper insights into the role of heteroaromatic scaffolds on PAM activity, a small library composed of four MIF-1 derivatives was envisioned using pyrazinoic acid as a Pro surrogate (Fig. 1). **Methods:** The synthesis includes the preparation of the C-terminal dipeptides by peptide coupling between N-Boc protected leucine residue with C-terminal residues (glycine or L-alanine methyl esters), followed by cleavage of the N-Boc protecting group. Next, C-terminal dipeptides are coupled with pyrazinoic acid, followed by an ammonolysis. Both ester and amide tripeptidomimetics will be tested for their ability to modulate the activity of D₂R by means of functional assays measuring the mobilization of cAMP and determining their toxicological profiles in human SH-SY5Y cells. **Results:** The synthesis of the new MIF-1 derivatives was accomplished with good overall yields. Moreover, *in silico* blood-brain (BB) permeation experiments showed that the replacement of Pro by pyrazinoic acid enhanced the BB permeation (BB ratio of 0.990), which compares favourably with the parent neuropeptide (BB ratio of 0.847). **Conclusions:** These new MIF-1 derivatives are expected to provide useful structure-activity information for the rational design of potent PAMs of D₂R, paving the way for the development of new anti-Parkinson hits.

Keywords: Dopamine D₂ Receptors, Heteroaromatic Scaffold, Melanostatin Neuropeptide, Parkinson's Disease.

Acknowledgments

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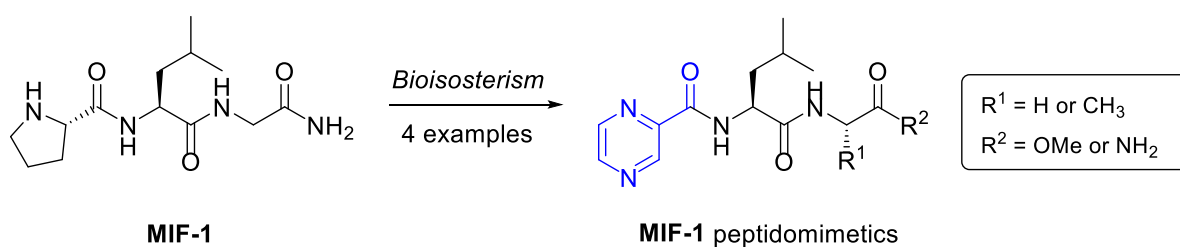


Figure 1: Structures of MIF-1 neuropeptide and MIF-1 peptidomimetics described in this work.



CRIMINOLOGY



21361 | Media use and children's internalizing and externalizing behaviours: the role of parental monitoring and supervision

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Background & Aim: Over the last decade, children's use and exposure to media have increased significantly. Previous studies revealed that exposure to certain types of media (e.g., television, computer/tablet, video games, or social media) is associated with several negative outcomes for children, such as low school performance, externalizing and internalizing behaviours, or attention problems. Parents are perceived as crucial for preventing their children's media use, particularly through appropriate parental monitoring and supervision [1]. Therefore, the current study seeks to understand how different monitoring strategies (active, restrictive, inconsistent, and absence of monitoring) might influence the relationship between media use and children's externalizing and internalizing behaviours. **Methods:** To do so, this quantitative study, based on a sample of middle-school children attending 5th and 6th grades, uses self-report questionnaires directed at the participating children and their parents/legal guardians to gather data. **Results:** Considering previous studies and the hypothesis guiding this study, it is expected: i) that parental monitoring moderates the relationship between media usage and externalizing and internalizing behaviours; ii) a negative relationship between active monitoring and internalizing and externalizing behaviours; iii) a negative relationship between active and restrictive monitoring and media time usage. **Conclusions:** Ultimately, this study seeks to contribute to the scientific knowledge on this domain by exploring data based on the Portuguese context and to raise awareness for the need to promote programs that enhance media monitoring practices to prevent its negative usage and associated consequences. Thus, this paper seeks to present and discuss the research goals and methodology adopted in this study to deepen the subsequent data analysis and interpretation.

Keywords: Parental Media Monitoring, Externalizing, Internalizing, Children.

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21450 | Exposure to community violence and juvenile delinquency: the indirect effects of guilt and shame

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Background & Aim: Over the last decades, youth delinquent behaviours have become a major concern, drawing the attention of researchers, politicians, and professionals, as well as the community as a whole [1]. Extensive research has been carried out on the negative outcomes of these behaviours, particularly concerning youths' development and later social, emotional, educational, and behavioural adjustment [3]. Therefore, it is unsurprising that this research field is on continuous growth, with different empirical studies seeking to understand the phenomenon further and explore the aspects linked to its emergence and maintenance [2]. Thus, the current seeks to contribute to this field by exploring the relationship between youths' exposure to community violence and delinquent behaviours while analysing the indirect effects that the moral emotions of shame and guilt might exert on this relationship. **Methods:** A quantitative approach and a cross-sectional design will be adopted to achieve this, using self-report questionnaires directed at a sample of high school youth attending 10th, 11th, and 12th grades in Portuguese public schools. **Results:** Considering data from previous studies, a positive relation between exposure to community violence and juvenile delinquency is expected. It is also expected that both guilt and shame mediate the relationship between exposure to violence in the community and delinquency, in which guilt-proneness and shame-proneness will predict lower levels of delinquency. **Conclusions:** The current study aims to expand the scientific knowledge on delinquent behaviours, which has been shown to be crucial for developing evidence-based prevention programs. Thus, this paper seeks to present and discuss the research goals and methodology adopted in this study to deepen the subsequent data analysis and interpretation.

Keywords: Juvenile Delinquency, Community Violence, Guilt, Shame, Youth.

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21508 | The Path to Killnet: An Analysis of the Group's Radicalization Process

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Background & Aim: The Russia-Ukraine war has been unfolding in a modern hybrid conflict, in which both parties use instruments towards physical and virtual targets [1], causing a great deal of instability in Europe. This conflict has generated pro-Russia criminal groups that aim to attack pro-Ukraine countries such as Portugal. Given the current nature of these events and lack of research on these groups, it has become crucial to comprehend how and why they are formed and how they grow, in order to prevent the emergence of more groups of this nature and harms caused by future potential attacks. Therefore, it is crucial to understand what leads individuals to join radical or extremist movements and conduct cyberattacks with severe harms [2]. This study aims to focus on the radicalization process of individuals entering the Killnet group or participating in its activities. In doing so, the goals are to understand risk factors for the integration into the group, particularly to understand the relevance of the use of Internet in this process. **Methods:** A qualitative study is being conducted through interviews with experts on cybersecurity and terrorism, complemented by the analysis of twenty-one Portuguese online news articles, published from February 2022 to April 2024, about Killnet and its attacks. **Results:** The project is ongoing and provisional results will be presented and integrated with current literature. The presentation will show if and how individuals are being radicalized through the Internet and which individuals tend to integrate Killnet, particularly regarding their sociodemographic features and risk factors. Preliminary results show that the group is abandoning its hacktivist nature and becoming a full cyberterrorist threat. **Conclusions:** Scientific literature focusing on the path and reasons motivating individuals to integrate groups like Killnet is limited. The current study intends to fill in this gap, thus generating new knowledge on this relatively new and understudied topic.

Keywords: Killnet, Hacktivism, Radicalization.

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21516 | Methodological challenges of researching prison settings: examples from Brazil and Portugal

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Background & Aim: Prisons are usually invisible places for both the public and the researcher, often proving to be challenging research sites [1]. As a result, academics are increasingly sharing their personal experiences conducting research in prison settings, highlighting the myriad challenges involved in gaining access and conducting research within these environments [2]. This study aims to discuss and explore some methodological challenges in conducting qualitative research within prison settings, specifically focusing on Brazil and Portugal. **Methods:** The challenges discussed were encountered during the data collection phase of two different studies carried out in Brazil and Portugal, both as part of master's theses in Criminology. The Portuguese study investigated the relationship between prison architecture/design and inmate behaviour through semi-structured interviews with 11 inmates across five male prisons. Conversely, the Brazilian study examined the experiences of incarceration by the LGBT prison community, gathering data through semi-structured interviews with 10 inmates confined in a male prison. **Results:** A systematic and critical analysis of the challenges encountered during empirical research revealed similarities and differences. The most pressing challenges faced by the researchers pertained to ethical concerns and access to the prisons; power dynamics and constraints on both inmates and researchers; participant recruitment; and the interview settings. Considerations regarding the emotional impact of these studies on the researchers will be addressed. **Conclusions:** Although courses and textbooks offer relevant considerations about collecting, analysing, and interpreting qualitative data, going into the field during concrete empirical research reveals many unanticipated challenges [3]. This presentation intends to clarify and provide advice about research in carceral settings, supporting the creation of knowledge and better preparing future generations of researchers.

Keywords: Methodological Challenges, Prison Research, Qualitative research.

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21548 | How does motherhood influence the adaptation to prison? Exploring the perceptions of the prison staff

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Background & Aim: Motherhood plays a significant role in shaping women's experiences within the prison environment, affecting their adaptation, identity, well-being, and subsequent release [1][2][3][4][5]. Thus, this research seeks to explore the perspectives and experiences of prison staff working in female prison facilities that accommodate incarcerated mothers and their children. Specifically, it intends to explore the influence of motherhood on these women's process of adaption to prison, the impact of their incarceration on the children, and the challenges faced by professionals in providing support and intervening with them. **Methods:** This study follows a qualitative approach using semi-structured interviews as the data-gathering measure. The interviews will be conducted with prison professionals accompanying female inmates whose children are with them while serving the prison sentence. Considering the study's research questions, the interviews will focus on the influence of motherhood on the process of adapting to prison, children's experiences in this context, and the importance of professional support. **Results:** Based on previous studies and the dimensions explored during the interviews, it is expected that participants describe motherhood as a significant influence on women's adaptation process, highlighting the challenges they experience as professionals in providing adequate support for mothers and their children, given the complexity of family dynamics and the limited resources available in the prison setting. **Conclusions:** This research underscores the importance of exploring the perspectives of practitioners intervening with imprisoned mothers, noting the importance of developing effective interventions tailored to address women's and children's needs.

Keywords: Motherhood, Incarceration, Prison Staff, Female Prisons, Interviews.

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21710 | Forest fires as environmental crimes: Analysis of official crime records

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Background & Aim: This poster delves into a prevalent environmental concern in Portugal: forest fires, which have inflicted substantial damage on the ecosystem and society [1]. The study investigates law enforcement strategies in detecting and responding to these crimes [2;3], elucidating the characteristics of registered forest fires and offenders⁴ to provide a comprehensive understanding of wildfire crime. **Methods:** Data were sourced from an analysis of official reports by the Polícia Judiciária (PJ) and Guarda Nacional Republicana (GNR), complemented by records from social control institutions such as “Estatísticas da Justiça” spanning from 2015 to 2022. A mixed-methods approach combining quantitative and qualitative analyses was employed. **Results:** Analysis revealed that GNR accounted for over 42% of forest fire cases, while PJ registered 39.7% of them. Demographic data from 208 suspects indicated an average age of 47.8 years, predominantly male, with a minority having a prior criminal record. Notably, 2018 saw the highest number of court cases, whereas by 2020, the figure dropped to 109. Similarly, 2018 recorded the highest number of defendants and convictions, with 2020 exhibiting a decline in both. Sentences predominantly consisted of suspended prison terms followed by fines. **Conclusions:** Consistent with existing literature [4], findings underscore that the majority of forest fire offenders are middle-aged males [5] with no meaningful criminal history. However, a critical examination of the data reveals significant gaps, notably pertaining to educational and employment backgrounds [6], as well as insufficient information on the consequences, victims, and societal impacts of these crimes [7]. Addressing these deficiencies is imperative for advancing criminological research, formulating informed policies, enhancing victim support, and fostering public awareness [8].

Keywords: Wildfire Crime, Bushfire, Wildfire Offenders, Law Enforcement.

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21711 | Why do we fall for fake news? Using psychophysiological measures to understand the susceptibility to disinformation

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Background & Aim: The spread of disinformation is harmful to society, especially during political elections and crises. Understanding how people discern real and fake news is complex, but crucial to prevent disinformation and its dissemination. The cognitive dissonance theory says that people experience discomfort when faced with inconsistencies in their thoughts, and research has shown that news content that aligns with an individual's political attitudes is processed more easily, leading to better understanding – individuals tend to overvalue the veracity of news consistent with their political attitudes and vice-versa. Research has focused on the cognitive processes involved in identifying fake news, but knowledge about affective processing may be crucial to understanding the phenomenon. **Methods:** This laboratory experimental study aims to understand the factors related to the identification of fake news as true, focusing on the influence of political attitudes. It intends to describe and compare the visual inspection patterns of fake and real news and understand whether and to what extent specific cues of the images presented trigger a state of alert, measuring the selective attention to the news using the Eye Tracker and psychophysiological measures (cardiovascular and electrodermal activity). Participants will be shown 10 headlines of real and fake political news taken from a database created for experimental research on disinformation. A survey will be used to search individual differences in the identification of real and fake news according to a set of characteristics (e.g. political orientation, conspiracy mentality). **Results:** The methodology used, and its expected results will be outlined. **Conclusions:** This study could provide valuable insights into attentional and affective processes involved in news perception and have implications for criminological research and preventing the spread of disinformation.

Keywords: Disinformation, Eye Tracking, Psychophysiological Measures.

21747 | When observers become the observed: perceptions of the use of bodycams

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Background & Aim: Law enforcement agencies have been undergoing a trust and legitimacy crisis in many countries over the last few years. This crisis is related, to a considerable extent, to the increased media attention to cases in which police officers are accused of using excessive force in their interactions with citizens [1]. Consequently, there have been efforts to address these challenges, among which the implementation of bodycams stands out [2]. Therefore, it becomes relevant to study the perception of the Portuguese police elements regarding these devices to bring their perspective into the national discussion, considering that bodycams' implementation has already been approved. **Methods:** Given the limited national knowledge on the subject, using a sample of members from a Portuguese police body, the study will explore the perception of police elements regarding bodycams and the factors that may influence those perceptions, namely their level of agreement with using this technology. To achieve this goal, a quantitative methodology will be employed through the administration of an online survey. **Results:** The findings of this ongoing research will be presented. Based on the results of previous studies, it is expected that police elements support the use of bodycams and believe this technology will improve the safety of both citizens and police during interactions, police transparency, practices, misconduct, and fact-finding. However, it is expected that police elements with more years of service and more concerned with privacy are less supportive of the use of bodycams. **Conclusions:** This study aims to enhance scientific knowledge in this domain, particularly in Portugal, and to provide tools for policymakers.

Keywords: Bodycams, Police, Perceptions.

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21751 | Individual Differences Among Hackers

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Background & Aim: Despite a growing body of literature on hacking, it's still an area in which knowledge is scarce, mostly due to the difficulty of getting to the hackers themselves. This study seeks to fill some gaps by examining individual differences between hackers and non-hackers, as well as within white hat, black hat and grey hat hackers. **Methods:** A comprehensive survey was designed to capture the spectrum of individual differences among these samples, applied in universities and diverse hacker forums, containing measures of sociodemographics, self-control, personality traits and motivations. The data will be analysed in SPSS. **Results:** Findings from existing literature reveal that hackers typically display lower levels of self-control compared to non-hackers, while the variances among the delineated hacker typologies remains unexplored. In respect to personality traits, research has shown mixed results, yet certain traits, such as introversion, openness to experience and psychopathy, have been associated with hacking. Limited insights exist regarding differences in these traits among hacker types according to the Big Five and Dark Triad models. The survey for the present study is currently being administered. The sample currently comprises 121 individuals, of which 9 completed the survey and identified as hackers (6 white hat, 1 black hat and 2 grey hat), indicating a low prevalence. All types of hackers share a motivation for learning. White hats are somewhat motivated by sensation-seeking and proving themselves better than others, also having a strong inclination towards doing good and helping others. The grey hat sample shows motivation towards intellectual challenge, curiosity, leisure, and fun. Further conclusions about motivations and other characteristics will be drawn from a more robust sample. **Conclusions:** This study emphasizes the importance of recognizing individual differences in understanding hacking. Studying the interaction of these factors with hacking behaviour will contribute to filling critical gaps in the literature, regarding hackers and their modus operandi. Moreover, delineating the distinct profiles of white hat, black bat and grey hat hackers not only enhances our understanding of hacker typologies but also informs interventions aimed at cybersecurity and digital ethics.

Keywords: Hacking, Personality, Individual Differences, Hackers.

21851 | Youth in the Digital Era: Unravelling the Complexities of Online Grooming and Sexual Solicitation in Portuguese Teenagers

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Background & Aim: The Internet has become a vital part of everyday activities and cultures, thus social life has moved to cyberspace. Despite its benefits, the Internet has also introduced several threats [1]. Online Grooming (OG), like its offline equivalent, is defined as the act of preparing minors for abuse by building trust and relationships. This may result in Sexual Solicitation (SS) and can lead to Sextortion, in which victims are pressured to supply more graphic material, possibly intensifying the harm [2]. Early internet exposure stresses the need to recognize and address associated risks. Given adolescents' widespread internet use, preventive measures are crucial. Identifying risk and protective factors in 12 to 17-year-olds [3][4] will inform policies and education efforts, enhancing digital security for this at-risk group. **Methods:** This research will quantitatively explore OG, SS, and Sextortion in Portuguese youth through online surveys in selected schools, reducing costs and enhancing response rates. Convenience sampling will be used due to spatial limitations. Authorization and informed consent will be obtained from school authorities, parents, and teenagers, with non-compliance leading to exclusion. **Results:** It is expected that victims of OG and SS will show a lack of parental supervision, online safety knowledge, and increased sexualized behaviours [4]. Risk factors may include being female, younger age, involvement in sexting, and exposure to cyberbullying [5]. Psychological factors like depression and low self-esteem are likely to increase victimization risk [6]. Conversely, protective factors such as parental supervision, internet usage monitoring, and online safety education will likely reduce risks. It is expected that victims of OG and SS will have a higher probability of suffering Sextortion. **Conclusions:** This study will offer valuable information for policymakers and educators to create specific measures, promoting an increasingly secure online space for Portuguese youth.

Keywords: Online Grooming, Sexual Solicitation, Sextortion.

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21854 | The reaction of the Justice System to Environmental Crime

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Background & Aim: The poster represents the research conducted with official data on pollution crimes and hazardous activities to the environment, as outlined in articles 279º and 279-Aº of the Portuguese Penal Code, respectively, and their consequences. In the international literature, there is no consensus on the definition of environmental crime. On one hand, it is defined as an act of omission; on the other hand, environmental crime can be characterized as a regulatory offense, which is also considered an administrative offense, meaning a violation of a regulation not listed in the penal code, but carrying an underlying punishment. In Portugal, criminological studies on this type of crimes are not yet common, and this study aims to fill this gap by analysing the data produced by OPCs on pollution crime. **Methods:** The analysed data consisted of offenses reported by authorities in Portugal (2010-2023), and all information found in the crime reports was relevant for the study. These data were collected from the official platforms of the authorities. The sample consists of ten recorded offenses for these crimes. **Results:** The most active OPC that reported pollution crimes was the GNR, which frequently recorded crimes during inspection and patrol actions. The offenses in the study involved cases of pollution from asbestos, automotive components, watercourse contamination, and waste. The characteristics of the offenders described in the news are superficial, but they are usually male individuals, with References:to legal entities as well. The damages are not well specified. The results obtained regarding the OPC's actions, where fines or license suspensions are applied, generally, align with the state of the art. **Conclusions:** The study and the results are consistent with the literature. However, to enhance research on these types of crimes, it would be relevant if the OPCs provided more detailed data, which would also help raise awareness among the population about its risks.

Keywords: Pollution, Hazardous activities to the environment, Environmental crime, Environmental Enforcement, OPC (Órgãos de Polícia Criminal).

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21871 | The influence of risk and protective factors on female antisocial behaviour

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Background & Aim: Despite extensive research on risk factors for juvenile delinquency, most studies have predominantly focused on male delinquency leading to a gap in understanding female adolescent offending^[1]. Therefore, this study aims to investigate the factors that contribute to female antisocial behaviour. Specifically, it will examine both risk factors (eg. community disorganization, drug availability, and family history of antisocial behaviour) and protective factors (eg. pro-social involvement, attachment, and belief in moral order). **Methods:** In this study, risk and protective factors for delinquency were assessed using the Communities that Care (CTC-YS) ^[2,3], which provides an assessment of risk and protective factors across four domains: family, community, school, and individual. This self-report questionnaire was administered to a total of 784 students. After removing males, our sample comprised 356 female participants, aged between 10 and 21 years (M=14.56). **Results:** In this preliminary phase, it is expected that various factors will influence female antisocial behaviour, however, family and peers are expected to be the most significant. Not only significant risk factors but also offer the most substantial protective benefits. This emphasizes the significance of familial and peer units in shaping the probability of female antisocial conduct. These findings would align with previous literature that found that the most common explanations advanced for female antisocial behaviour cite familial factors ^[4] along with the fact that deviant peer influence is a salient risk factor for female offending ^[5]. **Conclusions:** This study seeks to address the knowledge gap regarding the applicability of male-centric risk factors to female antisocial behaviour. Furthermore, it aims to highlight the necessity for prevention and intervention strategies that consider gender differences. Emphasizing gender issues will pave the way for more effective, gender-specific prevention strategies and programs.

Keywords: Female Antisocial Behaviour, Risk Factors, Communities That Care.

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21938 | Critic of the Legal Context Related to Environmental Crimes

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Background & Aim: This paper aims to analyse the environmental context from the perspective of law and green criminology, based on Evgeni Pachukanis' General Theory of Law. This intention is to introduce into environmental criminological analysis the perspective of law as an agent that reinforces the logic of the commodification of natural resources, such as water, minerals, plants, biomes and living beings, and how this process feeds the capitalist system of exploiting the planet through merely channelling legal support. **Methods:** The methodology used was theoretical analysis, with dense bibliographical research, as well as emblematic practical cases in the context of Brazil, through a materialist approach, seeking to understand the importance of the contribution of Marxist criticism to law. **Results:** As a result, a criminological discussion about the formation of powerful conglomerates active in extractive activities was briefly addressed, generally in countries positioned on the periphery of global capitalism. There was an understanding of how large corporations operate under the bourgeois legal logic and its commodity-based model, which allows them to exploit environmental resources in a harmful way without facing significant legal penalties, in a system of selective criminality. **Conclusions:** In conclusion, it is impossible to promote an effective discussion on the accountability and punishment of big business without first critically analysing the true meaning of law, considering the global and imperialist disparity between North and South. Law alone cannot guarantee equity and justice in the relationships mentioned, but it represents a space for struggle that needs to be constantly reviewed and occupied by sectors of society committed to transforming unequal patterns. Only after this process can we contribute, and only if we contribute, to an effective path to change, which is intrinsically linked to the transformation of modes of production in favour of an egalitarian society.

Keywords: General Theory Of Law, Green Criminology, Commodity Form, Corporations, Corporations, Colonization, Mode Of Production, Environmental Crimes.

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Figure 1: Luis Fernando M. Costa, Pachukanis (2017). Pintura a óleo. <https://sergio-ribeiro16417.medium.com/curso-de-introdu%C3%A7%C3%A3o-a-obra-de-pachukanis-e-coment%C3%A1rios-de-silvio-almeida-fcf470c25681>



Figure 2: Milhões de m³ de lama de rejeito vazaram da Barragem de Fundão em Mariana —

Foto: Reprodução/GloboNews. (2019). <https://g1.globo.com/mg/minas-gerais/noticia/2019/11/01/mariana-recuperacao-ambiental-e-o-programa-que-mais-evoluuiu-em-4-anos-mas-ainda-esta-atrasada.ghtml>

21968 | The Portuguese Fake News Database

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Background & Aim: The current speed at which information is shared on the internet is a cause for concern about the spread disinformation, which is any false information deliberately disseminated online with the aim of deceiving, manipulating, confusing, persuading and influencing, resulting in a threat to the stability of free and democratic societies. The goals of this study are: i) To understand the patterns and evolution of fake news dissemination; ii) To explore which category of news is most targeted for fake news creation; iii) To create a database of online news (true and fake) to be used for experimental studies in the field of disinformation.

Methods: This study is divided in two stages. The first consisted in the collection of 116 news from the Poligrafo website, whose link to access each news was inserted in a table in Excel format with the respective classification and its category and subcategory. Only fake and true news were selected for precision issues. The second stage will be the administration of a survey where 50 online news chosen from the previous stage will be evaluated by a sample, following the procedures of Guedes et al., (2021). The news will be classified for their fakeness, willingness to share, to open it, valence and arousal. **Results:** The news database will be an important tool to laboratorial experiments in the field of disinformation, since it will allow the selection of news with criteria. Furthermore, it facilitates the comparison of results across. **Conclusions:** This research provides valuable insights into the patterns of fake news dissemination and which categories of news are most targeted, contributing to efforts to combat disinformation online.

Keywords: Disinformation, Fake News, Database, Experimental Studies.

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**22035 | Assessing antisocial attitudes within the framework of the Integrated
Cognitive Antisocial Potential (ICAP) theory: Development of the new
Antisocial Behaviour and Beliefs Assessment (ABBA)**

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Background & Aim: The Integrated Cognitive Antisocial Potential (ICAP) theory provides essential insights into the development of criminal behaviour. The key construct of the ICAP theory is the Antisocial Potential (AP), which can be divided into short-term and long-term APs. Long-term AP is influenced by various factors such as strain, modelling, and socialization. Long-term AP is theorized to vary with age, reaching its peak during adolescence, followed by a decrease in adulthood. On the other hand, short-term AP is primarily influenced by situational factors. According to the ICAP theory, the interaction between individuals and their environment leads to antisocial behaviour. The Antisocial Attitudes (AA) scale was initially used to assess long-term AP in the Cambridge Study in Delinquent Development (CSDD). The current study aims to develop a new assessment tool designed to evaluate short-term and long-term APs within the ICAP's framework. **Methods:** To create the new Antisocial Behaviour and Beliefs Assessment (ABBA) scale, we first reviewed the existing literature on antisocial attitudes to identify the most relevant factors to include. Next, we will create a pool of items to be reviewed by a team of experts. Then, we will develop a list of vignettes featuring different scenarios. Finally, we will carry out an assessment of the psychometric qualities to validate the new scale. **Results:** The psychometric qualities of the ABBA scale will be tested among adolescents and young adults in school settings, by analysing its validity (i.e., factor analysis, convergent, and known-groups validity) and reliability (i.e., internal consistency and test-retest reliability). **Conclusion:** The ABBA scale will provide a new valid and reliable measure of antisocial beliefs, which specifically targets the core constructs of the ICAP theory. This innovative tool will allow the testing of hypotheses regarding the ICAP's theory and its predictions about the development of criminal and violent behaviours.

Keywords: Crime, Integrated Cognitive Antisocial Potential (ICAP) Theory, Antisocial Attitudes.

22036 | Police perspectives on the use of big data in criminal prevention and investigation

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Background & Aim: Studies demonstrate that the use of Big Data in criminal prevention and prosecution can increase the effectiveness of policing, but also can accentuate social inequalities and worsen disrespect for citizens fundamental rights. Therefore, this work aims to access the perceptions of members of the Portuguese police forces regarding the use of Big Data in policing.

Methods: Since the objective of the study is to access the perceptions of members of the Portuguese police forces regarding the use of Big Data in policing, it was decided to carry out a qualitative methodology. The objective is to carry out no less than 10 semi-structured interviews with commanders, analysts and field officers from the Porto Judiciary Police and the Porto Metropolitan Command of the Public Security Police and data analysis will follow thematic analysis by Braun and Clarke (2006).

Results: It is expected that the interviews reflect the findings of the literature, that is, although professionals recognize that Big Data contributes to a greater preventive and predictive capacity of police forces, enhancing the effectiveness of policing in reducing crime rates, this technological tool encourages criminal persecution based on color, ethnicity or social class and continuous and permanent mass surveillance. In this sense, studies warn of the need for the results produced by these technologies to be accompanied by an exercise of interpretation and reflection on the data carried out by the police. **Conclusions:** Big Data empowers police forces in their preventive and predictive capacity. However, this technological tool is not free from problems, which must be noticed and taken care of by professionals who use it to fulfil the objectives of criminal prevention and prosecution. It is concluded, therefore, that adequate training of police professionals on the risks of Big Data is necessary.

Keywords: Big Data, Combating Crime, Efficiency, Fundamental Rights.

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22068 | Fear of Sexual Harassment in Transit Environments

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Background and Aim: Over the past decade, sexual harassment (SH) in public spaces has gathered considerable attention due to its widespread prevalence. Nevertheless, its extent, where and how it occurs, still lacks empirical evidence, especially in the transit environments. This study aims to analyse the victimization and fear of SH in the context of public transportation, examining the influence of individual variables on these. Additionally, it seeks to understand the effect of transportation context and the physical, social, and temporal environment on the fear of SH. Finally, it aims to analyse the impact of fear on the mobility of those using these forms of transportation. **Methods:** The research is based on the administration of a survey to students at the University of Porto and other populations, through dynamic email and social networks, with a target sample of at least 300 individuals. Data will be analysed using IBM SPSS Statistics 29. **Results:** It is expected that women, the LGBTI community, younger individuals, and those with lower socioeconomic status will have a higher likelihood of becoming victims and experiencing greater fear of SH in the transit environments; that individuals will experience greater fear of SH in this context at night; that certain human and physical elements will decrease fear of SH (e.g. public lighting and CCTV cameras), while others will increase it (e.g. lack of visibility and maintenance issues); that individuals will have greater fear of SH when traveling to or when at stops/stations compared to when inside the transport; Lastly, that individuals with greater fear of SH in this context will adopt more avoidance and risk management strategies. **Conclusions:** The harms of SH represent a threat to the well-being of victims; therefore, a better understanding of its multifaceted and complex nature is essential. Given the scarcity of empirical studies conducted in Europe and in the Portuguese context, this research aims to fill this gap.

Keywords: Fear, Sexual Harassment, Public Transport, Gender, Mobility.

22099 | Hacktivism: Social Perception

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Background & Aim: Recent continuous advances in technology and the Internet have facilitated numerous legal activities, such as socialization, banking services, commercial activities, and information services [1]. However, these developments also opened the gate to new forms of crime, namely those that have emerged as a result of the fusion of real and virtual phenomena [2]. Hacktivism is one of these phenomena and it is an increasing concern nowadays. This study aims to analyse the social perception of Hacktivism and to understand which factors may influence the public support/opposition regarding this phenomenon. **Methods:** This is a quantitative study that will collect data which will be sourced by an online survey. The selected contestants that will be part of this online survey are from our society. The link will be shared across different platforms through social media (e.g., Facebook, Instagram, X, LinkedIn, etc.) and social groups (e.g., recreational associations, etc.). Beyond that, I will also try to share this survey link in discussion forums and request its dissemination to the students of University of Porto and different institutions. The selection criteria of this process will be: individuals with a domain in Portuguese language and with at least 18 years old. The online survey will be formed by three groups: 1) Sociodemographic characteristics; 2) Perception about people and institutions; and 3) Perception about online behaviours. **Results:** Based on scientific literature and prior research, it is expected in terms of results that: i) respondents' assessment of the hacktivist and his motivations influence support/opposition to hacktivism; ii) the greater the psychological distance from the hacktivist, the greater the opposition to hacktivism; iii) individuals with (or close to) far-right ideology will express greater support to hacktivism; and iv) individuals with lower trust in political institutions will express greater support to hacktivism. **Conclusions:** Hacktivism is a new phenomenon and research is lacking. As such, this study aims to contribute to filling this gap, namely by uncovering the drivers of public support for hacktivism, which is a crucial element for the success of hacktivist campaigns.

Keywords: Cybercrime, Hacktivism, Hacktivist, Social Perception.

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ECONOMICS



21997 | The impacts of drought on soybean agriculture in Northern Mato Grosso: an ESG approach

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Background & Aim: Amazon facing historic drought since June 2023 due to El Niño and climate change, impacting farmers [1][2]. Mato Grosso, leading in global soybean production, covers 903 thousand km² and ranks third in area among Brazilian states. Its agricultural dominance, with a value exceeding €32 billion concentrated in the Northern mesoregion, faces environmental challenges such as deforestation and biodiversity loss [3]. Around 80% of its production is exported, leading to international restrictions and policies against commercializing products from deforestation. Paradoxically, authors suggest the country pushes soybean cultivation's sustainability limits in the Amazon [4]. Socioeconomically, Mato Grosso has seen GDP growth but negative impacts on cultural values, freedom, security, and HDI due to soybean production [5]. This study aims to explore soybean agriculture in northern Mato Grosso, focusing on i) crop yield variation due to reduced precipitation from El Niño and climate change; ii) recent socioeconomic impacts of drought on soybean cultivation; iii) projects and policies mitigating negative impacts since 1989 to 2023. **Methods:** Quantitative methods to analyse public data on local soybean agriculture, precipitation, and resource consumption. Qualitative research will include interviews with stakeholders recommended by the Soybean Producers Association, NGOs, and municipal sources to assess the social aspect. **Results:** Initially, modestly adverse effects are foreseen in soybean production due to rainfall deficiency. Nonetheless, the environmental and social repercussions in the area are expected to persist, as evidenced by prior research. Progress in policies to counteract soybean's adverse effects is likely to be slow and negligible. **Conclusions:** This study aims to define the impact of soybean production from an ESG perspective in Mato Grosso. Soybean producers must prioritize forest conservation to ensure industry sustainability in the Amazon amidst increasing climate stress.

Keywords: Drought Impacts, Soybean Agriculture Impacts, Mato Grosso, ESG.

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ENGINEERING



21453 | Collaborative Development of a Serious Game to Promote Emotion

Regulation Strategies in Parents

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Background & Aim: Emotion Regulation (ER) refers to the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions [1]. Research demonstrates that parents' use of certain ER strategies correlates with the adoption of those identical strategies by their adolescents [2]. Existing programs already focus on emotions to train emotional skills in parents and adolescents. However, there is limited access to mental health services due to stigmatizing attitudes towards mental illness, lack of knowledge, and financial difficulties. Therefore, new interventions are needed to advocate for parents' and adolescents' better use of ER skills. Serious Games (SG) are proven to deliver significant benefits as a learning technology, making them suitable for the lack of interventions [3]. The goal of this project is to develop a SG to explore ER strategies with parents. **Methods:** The SG will employ a co-design approach. Firstly, semi-structured interviews will be conducted with 10 parents, 5 adolescents (between the ages of 10 and 14), and 5 psychologists. The primary objective will be to determine key motivating and learning features for the SG. After the game is completed, a usability evaluation will be performed with the SG's target audience, the parents. For this, a minimum of 25 participants is required to ensure the capacity to detect usability problems within the range of 90% to 97% [4]. **Results:** The anticipated results for the SG are to support parents in managing their emotions effectively and increase their knowledge of how they model, react to, and teach emotions and ER processes to their adolescents. **Conclusions:** This study proposes developing a SG to enhance parents' knowledge of ER strategies. Employing a co-design methodology ensures relevance in fulfilling the target audience's needs. This work offers a novel approach to improving parents' and adolescents' ER skills and ultimately contributing to better familial relationships and mental health outcomes.

Keywords: Emotion Regulation Strategies, Serious Games, Co-Design, Adolescents, Parents.

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21460 | Social Skills Training in Acquired Brain Injury: Co-Development of a Serious Game

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Background & Aim: Acquired brain injury (ABI) refers to a brain injury that causes severe consequences and requires patient rehabilitation to restore physical, cognitive, and social skills and to achieve independence [1,2]. Individuals with ABI also encounter challenges in social cognition, crucial for maintaining personal relationships and averting social isolation. Therefore, it is important to integrate strategies such as the use of serious games to enhance more traditional methods, as these may be considered less motivating. Serious games differ from video games in their more serious purpose, centred on education [3]. The integration of serious games into the rehabilitation process has proven highly effective, enhancing patient motivation and engagement during interventions [4]. This project proposes the co-development of a set of multiplayer serious games aimed at the cognitive rehabilitation of individuals with ABI, with an emphasis on training social skills. **Methods:** To ensure the study's success, a co-design process will be adopted, guiding the serious games' development to align with the needs and preferences of the target users. The co-design process will be divided into three phases. In the initial phase, we will conduct interviews to collect patients, health care professionals and caregivers' needs and preferences. In the workshop phase, we will engage in iterative development cycles in collaboration with the participants, with the aim to improve the game. Finally, in the third phase, we will conduct a usability test to assess the gaming experience. **Results:** Through the co-design process, we aim to obtain relevant information, enabling the development of a successful game for social skills training. These skills are crucial for sustaining relationships, preventing social isolation and preserving employment. **Conclusions:** Therefore, a serious game focused on social skills training could help these patients improve their social skills, mitigating social isolation, and averting job loss.

Keywords: Acquired Brain Injury, Social Cognition, Serious Games, Rehabilitation, Co-Design.

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21519 | Co-Creation of a Serious Game: An Innovative Approach for Promoting Emotion Regulation Skills in Parents and Adolescents

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Background & Aim: Emotion Regulation (ER) is crucial in navigating adolescence, which is marked by significant developmental tasks. As adolescents cope with diverse and unpredictable changes across all aspects of their personal growth and social environment, cultivating ER skills becomes imperative [1,2]. However, numerous adolescents present some difficulties in dealing with their emotions with associated mental health problems with potential enduring impacts, including anxiety and depression [3]. Although adolescence is a period of increased autonomy, adolescents still rely heavily on their parents for emotional guidance as they remain influential in shaping their emotional socialization [4,5,6]. Nevertheless, there is a significant lack of interventions in fostering ER skills for adolescents and their parents. Recognizing the impact of Serious Game (SG) approaches on enhancing emotional skills and comprehensive mental wellness [7,8], the objective of this project is to develop a multiplayer SG designed to educate and provide adolescents and their parents with effective ER strategies. **Methods:** Through various scenarios, the SG aims to present numerous strategies for managing emotions and to foster their comprehension and adoption in daily life contexts. The game's development will be underpinned by a collaborative approach, engaging adolescents, parents, and health professionals in a co-creation process. This will include three key stages: an initial co-design session dedicated to conceptualizing ideas, followed by a workshop aimed at verifying requirements, and a final usability evaluation. **Results:** Engaging the family in a serious game for training ER skills is expected to contribute to mutual learning and interaction, thereby improving emotional wellness during this crucial life stage. **Conclusions:** The final objective of this tool is to promote parents' and adolescents' ER skills and, therefore, contribute to adolescents' positive development and the prevention of psychopathology.

Keywords: Emotion Regulation, Adolescents, Parents, Serious Game, Co-Design.

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21523 | Valorisation of chestnut by-products to produce innovative emulsions

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Background & Aim: The global population increase leads to increased food consumption, resulting in a substantial agrifood waste. Trás-os-Montes region (Portugal) there is one of the largest chestnut productions in Europe [1] that generates agrifood residues such as chestnut shells, burrs and leaves. CyChest project aims to valorise these residues by extracting compounds that can be incorporated into high-added value products. Cellulose is a promising natural polymer for stabilizing emulsions and can be obtained from burrs [2, 3]. The main goal of this work is to extract cellulose presented in burrs and compare its behaviour as a Pickering emulsion (PE) stabiliser with commercial microcrystalline cellulose (cMCC). **Methods:** Cellulose extraction from burrs involves physical pre-treatment, hydrothermal extraction (70 °C, 4 h, 500 rpm), and basic hydrolysis with 100 mL of 10 wt.% NaOH aqueous solution (70 °C, 2 h, 500 rpm). The extract was filtered, washed, and dried. This procedure was evaluated using FTIR and TG. cMCC characterization involves SEM, laser diffraction (LD) and zeta potential analysis. Previously to PEs production, cMCC undergoes size reduction via ultrasound and PEs were prepared based on work developed by Ribeiro *et al.* [4]. The effect of cellulose concentration (2 – 7.5 wt.%) for a fixed 20:80 oil-water ratio on the PE stability was evaluated. The PEs were characterised by LD, optical microscope, and visual appearance after production and after one month of storage at room temperature. **Results:** Stable PE was achieved with 7.5 wt.% of cMCC, exhibiting consistent droplet size distribution over one month (~25 µm). The yield of burrs cellulose extraction was around 40%; the FTIR and TG analyses confirmed the removal of non-cellulosic compounds. **Conclusions:** In a further step, it is intended to produce PEs using extracted cellulose obtained from the burrs. This is a step forward for creating more sustainable emulsion-based products from the valorisation of chestnut residues and by-products.

Keywords: Cellulose, Pickering emulsions, Agro-industrial waste, Cellulose extraction.

Acknowledgments

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21537 | Exploring the Use of BIM (Building Information Modelling) in Enhancing Sustainable Project Management Practices in the Construction Industry: Diagnosis of Construction and Demolition Waste (CDW) using LiDAR-iPAD

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Background & Aim: In recent years, due to increasing urbanization, the volume of construction and demolition waste (CDW) has risen considerably in several countries, pushing concerns about sustainability. Consequently, requirements are being placed for companies related to waste information management, proper disposal, and mandatory reuse. This study aims to analyse this technology's potential to increase efficiency and sustainability in CDW management. The identification of construction products with greater relevance and potential for reuse, recovery or recycling will be sought. **Methods:** Initially, a narrative review was made to better understand the topic under study and observe current CDW diagnosis practices in the pre-intervention phase. Subsequently, a case study was developed using LiDAR-iPAD collecting data from the classrooms of the buildings in block B of Faculty of Engineering-University of Porto (FEUP). Following that, an analysis was conducted to verify the LiDAR-iPAD performance, such as the accuracy of the 3D models, system interoperability and the procedures for utilizing the technologies. **Results:** Initial results represent the author's qualitative assessment of the potential use of LiDAR-iPAD for diagnosing CDW in building rehabilitation projects. Aspects regarding the ease/difficulty of using the technology, level of accuracy of the obtained models and potential use of interoperable information already in digital format are highlighted. **Conclusions:** The conclusion of this study contributes to advancing knowledge on CDW management in built environment rehabilitation works. The role of LiDAR-iPAD technology in this context is highlighted. Findings benefit researches, professionals, project managers and regulators aiming for sustainable waste management practices.

Keywords: iPAD-LiDAR, twin transition, waste audit, CDW, diagnosis.

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I would like to thank Professors Diego Calvetti and Pedro Mêda for their dedicated guidance and valuable insights throughout this work. Additionally, I would like to thank the Faculty of Economics for the opportunity to participate in such an enriching event.

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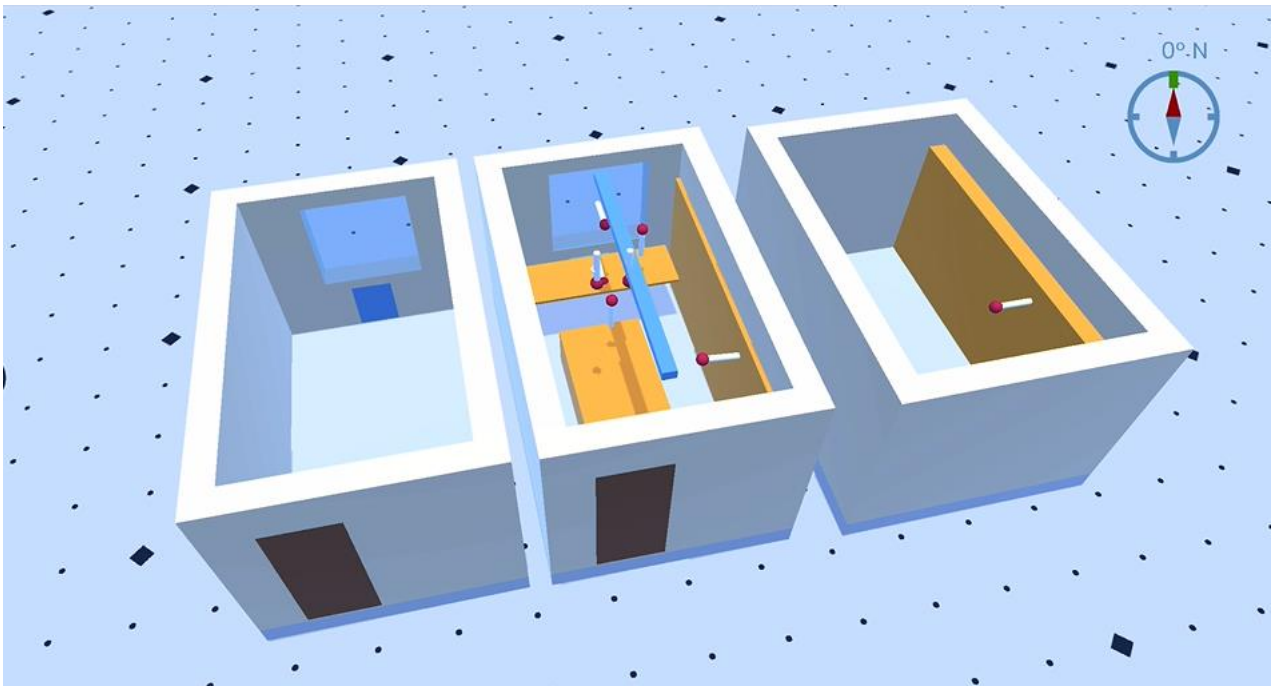


Figure 1: Scan using LiDAR-IPAD

21577 | KeyPoint-Based Hockey Player Action Recognition

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Background & Aim: The use of computer vision techniques in sports analysis has been gaining increasing attention in recent years. These techniques have the potential to provide real-time insights into player dynamics, team strategies, and game outcomes. However, accurately classifying player actions in complex sports remains a challenge [1]. Human activity recognition (HAR) based on computer vision has emerged as a promising approach to address this challenge, successfully applied in various sports, including hockey [2]. This study aims to contribute to the field of HAR in sports by developing a real-time classification system of hockey player actions.

Methods: The project comprises three stages to understand player dynamics during hockey games. The initial phase involves implementing the YOLOv7 algorithm, on a dataset of over 6000 annotated frames capturing players, referees, and goalkeepers during different games. Subsequently, precise player pose identification is achieved using the Open Pose library, known for its high performance in skeleton estimation, detecting 18 human body keypoints [3]. The final stage involves training a machine learning model to classify player actions, like neutral poses, passing or receiving the ball, shooting the ball, and celebrating. Two approaches were employed: one based on angles between keypoints and another directly using keypoints, both employing logistic regression as the classification algorithm. **Results:** The YOLOv7 algorithm was successfully implemented, achieving a mean average precision (mAP) of 94.9%. Open Pose identified 86% of 1015 poses with 14-18 estimated keypoints, with only 9% being complete poses, suggesting the use of Denoising Autoencoder for missing keypoints estimation. The action classification model achieved accuracies of 100% and 99% for the angle-based and direct approaches, respectively. **Conclusions:** Successful hockey action classification enhances sports analysis, advancing computer vision applications in dynamic game scenarios.

Keywords: Pose estimation, HAR, Hockey, Computer Vision.

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Figure 1: Player, referee and goalkeeper detection, using YOLOv7.

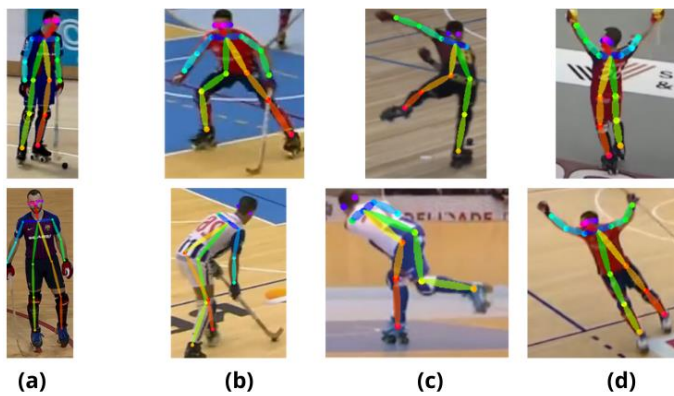


Figure 2: Pose estimation using Open Pose library to action identification: (a) neutral, (b) pass or receive ball, (c) shoot ball, (d) celebrate.

21607 | Design and Development of Lamps Using Additive Manufacturing Processes

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Background & Aim: Additive manufacturing is a manufacturing process that has been revolutionizing the industry of the future, serving as one of the pillars of the so-called Industry 4.0. Fused Filament Fabrication (FFF) technology stands out due to its ability to produce diverse products for several technological applications, at competitive prices and without material waste. With the evolution of FFF technology, the use of sustainable polymer filaments has become an extremely attractive option, such as the use of polylactic acid (PLA). This filament, produced from corn starch and sugar cane, is of renewable origin, biodegradable, and recyclable, making it a significant substitute for plastic and a promoter of sustainability. Therefore, the aim of this project is to integrate FFF technology into our daily lives by developing an LED desk lamp with multiple light effects, from its design to the conception of the final product. The lamps found in most middle and lower-class households are often underestimated as they represent a basic element. However, artificial light has a remarkable impact on space perception, human well-being, and health, and is responsible for generating unique experiences. That is what gave rise to the importance and the idea of multiple light arrangements and the appreciation of lighting aesthetics. **Methods:** To achieve the aim of this project, 3D modelling will be used with the assistance of Autodesk Inventor software, and thus, the design of the lamp will be created. After the design phase, it will be printed, and the electrical part will be assembled using LEDs. In a final stage, the costs associated with its production will be calculated. **Results:** The expected result is to obtain a lamp that is appealing to young generations, sustainable, and affordable. So far, the lamp's dome has already been printed. **Conclusions:** As a result, the development of this product allows the user to transform their surroundings according to their needs, turning this from a luxury into an added value in their daily lives, at affordable prices and in a sustainable way.

Keywords: Fused Filament Fabrication, PLA, Sustainability, Light effects.

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21706 | Mine Waste Stream Valorisation

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Background & Aim: The extraction of mineral resources has increased markedly in recent decades and, over the last ten years in particular, at a faster rate than economic growth. This trend is forecasted to grow steadily in the future. Worldwide transitions towards clean energy and electric vehicles will also accelerate the trend, as renewable energy sources require more significant amounts of metals than energy production from fossil fuels. Transforming mine waste into resources and incorporating other industrial waste will contribute to mitigating mining extraction's environmental, social and health impacts [1]. This work presents a study design to explore the potential use of different mine wastes: marble sludge, granite sludge, and limestone, to be incorporated into construction materials. **Methods:** The samples will be characterized by moisture content, particle size distribution, pH, chemical and mineralogical composition, water absorption, and methylene blue dye test. Contaminants will be separated, and natural leaching tests will be performed to assess the chemical stability of metals. The next step will be to produce different cement paste formulations incorporating the sludge mixture. The cement pastes will be tested for compressive and flexure strength. **Results:** The characterization results will indicate the potential for these materials to be incorporated into construction materials and an optimization of the mixture design. **Conclusions:** There is an increasing trend to replace natural materials in engineering works that is associated with sustainability principles and costs. Therefore, it is essential to understand the performance of these new materials and their long-term behaviour. Reducing the amount of mining waste that must be disposed of also offers the potential to create new economic opportunities. This work is ongoing.

Keywords: Mining Waste, Circular Economy, Valorization, Construction Materials, Sustainability.

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21713 | Environmental Management at IMPETUS

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Portugal³.

Background & Aim: The environmental management project at IMPETUS involves implementing ISO 14001 standards, emphasising sustainable practices. Organisations are increasingly recognising the importance of adopting eco-friendly strategies to enhance their environmental performance. The primary goal is to comprehensively analyse IMPETUS processes, consumptions, emissions, and environmental aspects. This project seeks to strengthen IMPETUS's environmental management system and contribute to a more sustainable operational framework by identifying risks and opportunities and adhering to compliance obligations. **Methods:** The project comprises two phases: the first involves organisational diagnosis and analysis, including environmental aspects and risks. The second phase consists of implementing the environmental management system, integrating it with existing quality management, and characterising production and customer requirements. **Results:** Tasks included team presentations, process understanding through on-site visits, reading IMPETUS work processes, and describing production and customer requirements. Indicators for resource consumption and waste production were determined. Environmental aspects, risks, opportunities, and a SWOT analysis were identified. The textile market analysis revealed the need to integrate diverse eco-label requirements. **Conclusions:** The project defined an environmental management procedure meeting ISO 14001 requirements. It established a foundation for IMPETUS to improve environmental performance with planned actions, control points, and roles. The organisation's potential in environmental issues was demonstrated, indicating a high number of compliance obligations and complex legal requirements. The environmental management system aims to optimise processes based on risks and opportunities.

Keywords: ISO 14001, Environmental Compliance, Sustainability, Green Management, Eco-friendly Solutions.

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Figure 1: Project logo.

21728 | Supporting Adolescents and Young Adults with Cancer through the use of a Chatbot Application

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Background & Aim: In recent years, there has been a troubling increase of cancer diagnoses among adolescents and young adults (AYA) [1], which are defined as individuals aged 15 to 39. And due to the profound impact of a cancer diagnosis in the early and formative years, AYA cancer patients are often confronted with more unique psychosocial challenges that require careful attention [2]. In order to properly tackle this issue, this project aims to develop a chatbot application directed towards supporting AYA cancer patients. It is of note that this application won't substitute medical professionals, but rather to offer a secondary means of support for AYA patients and to also alleviate medical professionals of their workload, and thus aiming for greater efficiency. **Methods:** The developed chatbot application will be supporting AYA patients by providing comprehensive answers to their queries, offering insights into the disease and its variety of complications. This study is going to perform a usability study with engineering and medicine university students for an initial validation of the informative content and technical aspects. **Results:** We expected to develop a chatbot capable of accurately and reliably responding to the myriad informational queries posed by AYA cancer patients, all while prioritizing patient privacy. Additionally, the application will emphasize ease of use and feature a design tailored to the comfort and preferences of the intended target audience age group. **Conclusions:** This work aims to contribute to the well-being of AYA cancer patients, filling the knowledge gap, reducing the strain on healthcare practitioners and further increasing chatbot's relevance in the medical field as a secondary means of support.

Keywords: Adolescents and Young Adults, Psychosocial Needs, Oncology, Chatbot.

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21729 | Challenges in Family Communication in Paediatric Cancer: Developing an Informative Chatbot

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Background & Aim: Paediatric cancer is a rare disease that presents significant challenges for families [1], particularly in effectively communicating about diagnosis and treatment [2]. Children and adolescents diagnosed with cancer face not only medical challenges but also psychological and social impacts [3]. Therefore, holistic care approaches are necessary. Communication regarding diagnosis and treatment is crucial but often challenging for parents [4]. A chatbot that utilizes artificial intelligence technology is proposed to address the issue of communicating illness and treatment information to children with paediatric cancer. The chatbot aims to provide accessible, personalized, and 24/7 support to parents while customizing the content to individual needs [5, 6]. This initiative pioneers the use of chatbots to enhance parent-child communication. **Methods:** The project aims to develop a chatbot to address communication challenges faced by parents dealing with paediatric cancer. A usability study will be conducted with healthcare professionals at the end of development to validate the answers provided by the chatbot, through self-reported measures. **Results:** The chatbot is expected to be reliable, easy to use, and adapt to the user's individual needs to facilitate clear and concise communication of information about the disease and its treatment. **Conclusions:** This project aims to establish the foundation for the wider implementation of technological solutions in this context and contribute to facilitating parent-child communication during challenging childhood cancer situations.

Keywords: Paediatric Cancer, Communication, Chatbot, Artificial Intelligence.

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21731 | Studies on Commercial Electroencephalogram's Electrodes for Future

Comparison with Textrodes

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Portugal; IFIMUP – Institute of Physics for Advanced Materials, Nanotechnology and Photonics,

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Background & Aim: Epilepsy is a neurological disease which affects 50 million people worldwide, primarily young children and the elderly [1]. Long-term electroencephalogram (EEG) is the gold standard for diagnosis, but commercial electrodes often cause skin irritation under these conditions [2]. Dry electrodes aim to eliminate these effects while maintaining signal quality, an arduous task due to capacitive effects during skin-electrode contact. Moreover, textile electrodes (textrodes) aspire to ally both signal quality and comfort. To study the textrodes behaviour, it is crucial to understand the commercial signals to use them as a reference.

Methods: To compare our developed textrodes, a study was conducted using commercial electrodes as a baseline. The electrodes were placed in standard positions (Fp1, Fp2 and M1) on 6 subjects (3 male and 3 female) instructed to follow our protocol. It consists of 3 recordings: one with the subjects eyes closed for 3 min, another of 3 min with open eyes, and a mixed record of 2 min (60s with eyes closed and then open for 60s). Video recording was executed to identify blinking. Headband usage is one of our aims, therefore tests with and without it were performed. Signal's power spectrum density (PSD) and Short-Time Fourier Transform were conducted to verify the expected rhythms and signal changes. Signal filtering was conducted and the optimal parameters estimated. **Results:** A preliminary study conducted on one subjects proved the amplitude increase with the headband usage, improving the SNR, even in a noisy environment. The Fourier analysis revealed differences between eye states. Furthermore, the estimated PSD highlighted the contrast in α band power between these states, aligning with our expectations. Notable, this difference was clearer with the headband usage, as shown in Fig.1.

Conclusions: Understanding the headband importance in the signal's quality could be improve the electrodes performance and be the key to higher quality textrodes.

Keywords: EEG, Textrodes, Signal Quality Detection.

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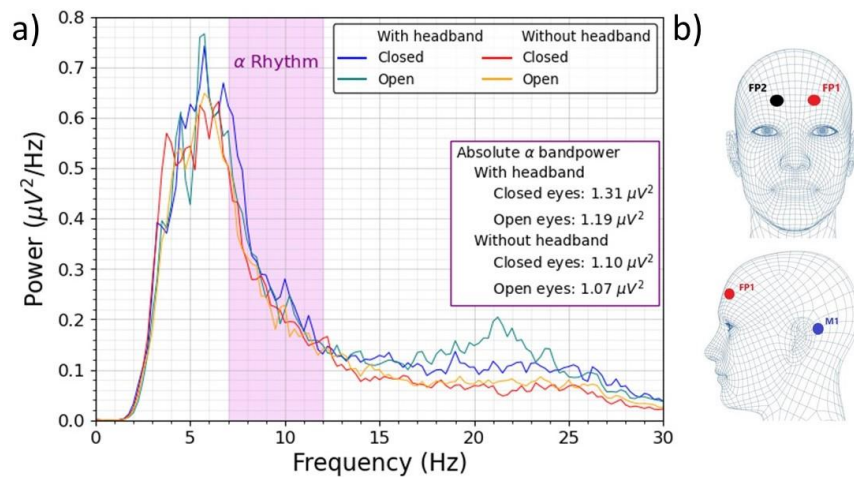


Figure 1: (a) - Comparison between the power spectrums for both studied cases with and without a headband; (b) - Electrodes positions used [3].

21796 | Development of edible Pickering emulsions as food sauce alternatives

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Background & Aim: Pickering emulsions (PEs), stabilized by solid particles, have attracted interest in various fields due to their stability ^[1]. For the food industry, PEs can be promising in the development of innovative food products to meet consumer trends for healthy and bioactive-based functional products. Considering the recent focus on using organic particles for producing food-grade PEs^[2], this work aims to produce PEs using lupin bean peels, a food by-product rich in cellulose, as a stabilizer. This approach contributes to addressing environmental concerns associated with the food industry^[3]. **Methods:** Commercial microcrystalline cellulose (cMCC) was first used as proof of concept. cMCC was treated using the ultrasonic device (50% of amplitude, 1 min) to achieve the proper size. For PE production, the sunflower oil was injected into the aqueous phase using a peristaltic pump (60 rpm) and a rotor-stator homogenizer (16000 rpm, 6 min) to ensure prompt dispersion. This study addresses the effect of cMCC particle concentration (1-10 wt.%) and oil/water ratio (30/70 and 50/50) on emulsion stability. The PE stability (size and droplet morphology) and rheological properties were studied over time (0-30 days) using laser diffraction, optical microscopy, and rheometer. The emulsion type (oil-in-water or water-in-oil) was determined with a droplet test. **Results:** Stable PEs were obtained with cMCC concentrations above 7.5 wt.%. At the moment, the PEs with 30/70 and 50/50 oil/water ratios were stable over 15 days and 7 days, respectively. Additionally, all produced PEs were oil-in-water emulsions. Regarding PEs rheological properties, higher cMCC concentrations and oil volume contents resulted in more viscous PEs. **Conclusions:** Stable PEs were achieved using cMCC as a Pickering stabilizer. These results open new opportunities to integrate cellulose obtained from agri-food waste, such as lupin bean peels, in developing high-value-added products, which is a step forward in the sustainability field.

Keywords: Pickering emulsions, Microcrystalline cellulose, Lupin Bean Peel.

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21806 | Beyond the Scaffold: Alginate-based 3D Biomaterials as a Tool to Investigate Neuroinflammation

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Background & Aim: Central nervous system degenerative disorders are rising worldwide, causing significant disability and morbidity [1]. Factors such as astrogliosis and neuroinflammation contribute to the outcome of these diseases. Astrocytes and microglia interact dynamically in this scenario, with extensive alterations in extracellular matrix (ECM) composition and, consequently, tissue mechanical properties [2]. In this study, we aim to use a 3D tissue-engineered model mimicking neuroinflammation to study the effects of ECM remodelling on neuroinflammatory processes. **Methods:** Modified alginate hydrogels were prepared by mixing alginate solutions of varied oxidation status with RGD and PVGLIG peptides. RGD was chosen for cell adhesion properties and PVGLIG for its matrix metalloproteinases' sensitivity, to recreate the ECM environment. The hydrogels' physical properties were analysed. Primary microglia cultures were established from P1-P2 Wistar Han rat pup cortices, and cells were embedded within the hydrogels. Cell viability was studied using live-dead and resazurin assays. A pro-inflammatory stimulus of LPS (lipopolysaccharide) was added to the culture and the resulting activation status was assessed by quantitative polymerase chain reaction (qPCR) and measurement of nitrite production. **Results:** From the formulations tested only the 2% alginate 30% oxidation impacted the total number of cells, both in the presence or absence of LPS stimulus. However, live-dead assay showed that more than 70% of cells were alive in all tested conditions. Evaluation of nitrite production showed an increase in all formulations upon LPS stimulation. Two of the control conditions (2% alginate 60% oxidation and 2% alginate 30% oxidation) showed a higher concentration of nitrites' production in relation to the 1% alginate 60% oxidation alginate formulations. While in the latter the highest increase in nitrite production was observed with LPS activation. **Conclusions:** These results suggest a likely interplay between ECM mechanical properties and microglia function.

Keywords: Neuroinflammation, Microglia, Extracellular Matrix, Alginate Matrices.

Acknowledgements

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21813 | Co-creation of Multiplayer Serious Games for Cognitive and Psychosocial Rehabilitation

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Background & Aim: Acquired Brain Injuries can result in brain damage that disrupts normal brain function, making community reintegration challenging for affected individuals. Furthermore, the tasks involved in traditional cognitive rehabilitation are often considered repetitive [1] and tedious. This project aims to create a platform of multiplayer serious games with both competitive and collaborative features. It will complement the cognitive rehabilitation of patients with acquired brain injury and create the opportunity for them to interact naturally with each other and the people around them. Existing similar options have proven beneficial for the rehabilitation process, but their development did not follow a co-design and the products lack multiplayer features, thus limiting opportunities for socialization among patients with cognitive impairments. **Methods:** As this project focuses on user experience and usability, it will follow a co-design method of three phases with the target population: adult patients with acquired brain injury, their family members or caregivers, and therapists or professionals in related fields. First, we will conduct semi-structured interviews, then a workshop where participants will play a beta version of the game, and finally a usability study to validate the final prototype. **Results:** We aim to gain a deeper understanding of the stakeholders' expectations to create a robust and user-friendly platform that enables them to stay socially connected and supports their cognitive treatment. This project emphasizes the importance of fostering social interaction within this community through both cooperative and competitive gaming models. **Conclusions:** The platform aims to enhance the rehabilitation process by providing value and motivation through serious games that track their treatment progress. Our goal is to offer patients a motivating and engaging tool tailored to their needs and preferences, with the potential to positively impact their lives.

Keywords: Acquired Brain Injury, Cognitive Rehabilitation, Multiplayer Serious Games, Co-design.

Acknowledgments

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21815 | Development of an Autonomous Boat for Versatile Aquatic Exploration

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Background & Aim: Advancements in Marine Technology have made possible the use of rigid sails as a more robust and energy-efficient means of propulsion [1]. With resilient control systems, it is feasible to develop a small autonomous boat capable of completing the *MicroTransat Challenge* [2], a competition to cross the harsh Atlantic Ocean without human intervention. **Methods:** The current MVP (Minimal Viable Product) has just a propeller and a rudder. The goal of this work was to implement a simple discrete PID (Proportional-Integral-Derivative) algorithm that only controls the rudder. For the controller to work we assume the actuator is linear and the sampling rate is constant, we managed that by calibrating the servo motors and by keeping a constant *baud rate* across all the sensors. The codebase is being developed following the principles of Object-Oriented Programming (OOP), so as to make it easier for future expansions and added complexity. The project currently runs on an *Arduino DUE* with a later intent of using a FPGA for optimization and lowered power consumption. Simulations are being developed to predict the behaviour of the model and tune its parameters [3]. **Results:** Calibrations were performed on the servo motors in order to have them operating as linear systems, so as to make the PID controller more precise. A lot of time was given to the fetching of data coming from the sensors (GPS and Compass) - thus making the data reliable and of easy access. **Conclusions:** The development of an autonomous boat equipped with rigid sails marks a significant milestone in marine technology. The successful fusion of autonomy and navigational simplicity not only positions the boat as a cost-effective platform for ocean cartography but also opens up new avenues for aquatic exploration. Through ongoing simulations and field testing, we continue to refine our control algorithms and optimize performance, ensuring scalability and robustness in varying environmental conditions.

Keywords: Unmanned Surface Vehicles (USV's), Rigid Sail, Arduino, Control Algorithm.

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and submission of this abstract. We also wish to thank PhD student Murillo Villa for his generosity during our time in the laboratory.

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21821 | Direct capture and recovery of carbon dioxide from atmospheric air with alkaline solution

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Background & Aim: The rise of atmospheric CO₂ concentration leads to several environmental issues and disrupts the natural balance of the earth's natural systems. Capturing the atmospheric CO₂ via absorption with alkaline solutions (such as KOH) [2] is a well-studied process that can be combined with electrolysis for scrubbing solution regeneration and production of H₂ to reduce energy costs. **Methods:** The theoretical model and equipment sizing of the gas scrubber was simulated with AspenPlus software, alongside empirical electrolysis studies. **Results:** A laboratory-scale gas scrubber was sized and simulated via AspenPlus, considering an inlet air flowrate of 200 L min⁻¹ and a KOH feed of 30 mL min⁻¹. For 0.5 m height and 10 cm diameter of packing, it was estimated the system would be able to capture 5 to 6 g CO₂ h⁻¹, equivalent to around 45 % removal efficiency with solution recycling. Preliminary electrolysis tests were simultaneously carried out, consisting of linear sweep voltammetry of two solutions: 1 M KOH electrolyte, a standard of the technology, and another one with *ca.* 0.5 M K₂CO₃, formed after reacting with CO₂. This carbonate-rich electrolyte displayed higher current when compared to the KOH solution. To properly study this increase, the gas products of cathode and anode must be independently quantified, something not possible with the half-cell used. Future measurements will be done with a H-type cell and the correct membrane to prevent product recombination. **Conclusions:** The gas absorption process until now has only been studied via simulation, experimental results will soon be gathered and will allow for the empirical validation of the model. Preliminary studies of electrolysis show an increase in electrochemical activity, translated in higher currents for carbonate solutions. However, the production of H₂ and CO₂ needs to be adequately quantified.

Keywords: Carbon Capture, Absorption Column, Electrolysis.

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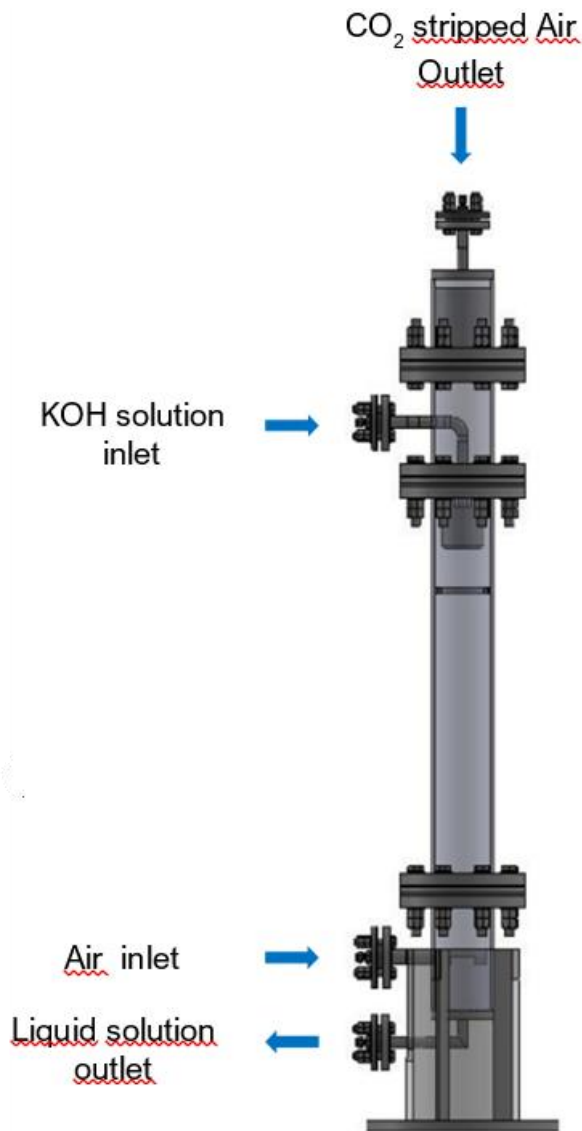


Figure 1 - Schematic of the absorption column.

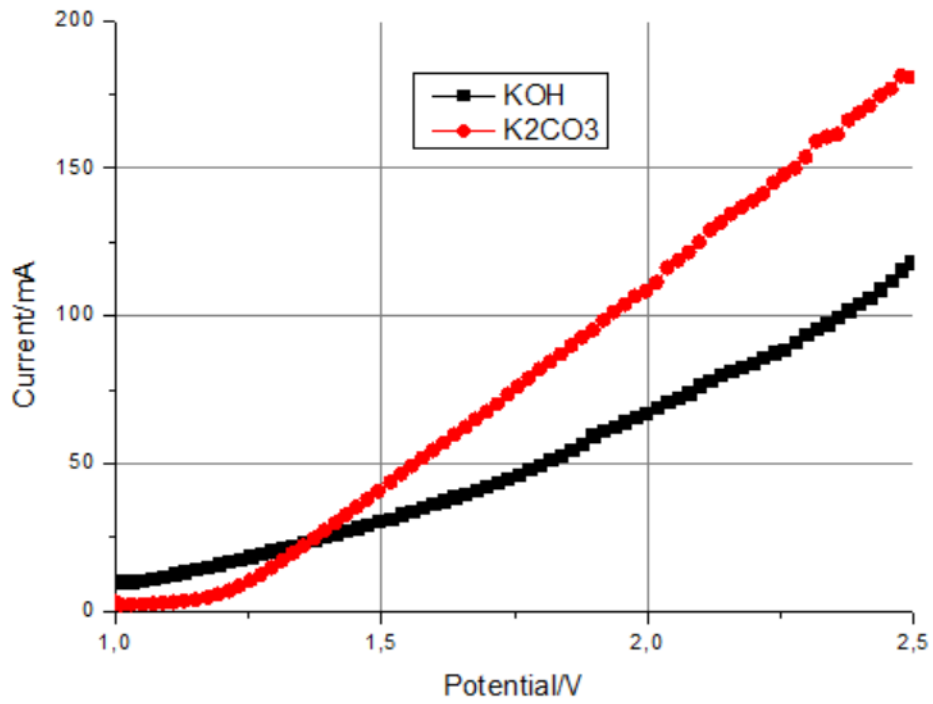


Figure 2: Linear Sweep Voltammetry results for KOH and K₂CO₃ electrolyte solutions under the same conditions.

21892 | Chatbot for the Promotion of Healthy Lifestyles in Oncology Patients

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Background & Aim: Cancer poses a significant challenge in healthcare worldwide, impacting millions of lives. With European statistics projecting a notable increase in new cases in the coming years [1,2], the demand for holistic and patient-centred care has never been more critical. The importance of maintaining a healthy lifestyle during and after cancer treatment cannot be overstated, as it plays a crucial role in supporting individuals through the complex journey following a cancer diagnosis. Leveraging technology, particularly chatbots, presents a promising avenue for addressing these evolving needs [3]. The literature suggests that through meticulous development and evaluation, chatbots can effectively provide tailored support to patients [4]. This research focuses on developing a conversational system to address the information gap concerning the adoption of healthy lifestyles in individuals with cancer.

Methods: To achieve these aims, a chatbot is being developed using the GPT architecture, renowned for its NLP proficiency. The focus is not only on technological development but also on crafting an intuitive and user-friendly interface. The chatbot's performance and user satisfaction will be assessed through a usability test with the target audience. Oncology patients will be recruited from patient associations to participate in the usability test. This evaluation will be conducted through an online questionnaire, utilizing the CUQ [5], supplemented with specific questions developed within the context of this study. **Results:** Our ultimate goal is to assess the user's experience of chatbots in answering the diverse needs of healthy lifestyles of oncology patients, with a particular focus on diet, sleep quality, and physical exercise. **Conclusions:** This study aims to emphasize the potential of chatbots in enhancing the quality of life for oncology patients. We expect to contribute to advancing patient-centred care and underscore the role of chatbots in improving outcomes for cancer patients.

Keywords: Chatbot, AI, Oncology, Healthy Lifestyle.

Acknowledgments

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21977 | Fused filament fabricated jumping rope handles for improved grip, mechanical strength and impact resistance

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Background & Aim: Growing interest surrounds enhancing 3D printed parts' mechanical properties [1]. These properties are influenced by material attributes, printing orientation, and raster width, affecting the parts' meso-structures and overall behaviour [2]. **Methods:** Tensile, bending, and Charpy impact tests are conducted on PLA and flexible (PLA soft 95A, TPU 95A) specimens with varied extrusion widths, layer heights, and orientations. The results help calibrate a computational model for behaviour prediction, leading to prototype testing of jumping rope handles. **Results:** Anticipated findings from mechanical tests on specimens will detail the mesoscale properties for a multiscale design approach of the handle. **Conclusions:** Tests will identify optimal printing settings (orientation, layer height, raster width) for both rigid and flexible filaments. Accurate material characterization is essential for a reliable model predicting the mechanical behaviour of extrusion-printed components.

Keywords: Fused Filament Fabrication, Printing parameters, Multiscale approach.

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22007 | Development of pyroelectric sensors for detection of biological events

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Background & Aim: Coronary artery diseases, characterized by the obstruction of heart-supplying arteries, are a leading cause of global mortality. Although stenting is the conventional treatment, it faces challenges due to numerous post-implantation complications, such as restenosis and thrombosis. The project explores the implementation of nanomaterials with pyroelectricity that convert thermal to electrical energy as sensors for early detection of these biological events. **Methods:** The starting point will be the preparation and characterization of pyroelectric nanomaterials (PVDF and ZnO), followed by manufacturing inks with enhanced pyroelectric properties, comprising organic polymer-based and inorganic materials-based formulations. The following step will be the assessment of the pyroelectric properties of the samples, measuring the dielectric constant, polarization, pyroelectric coefficient, and thermal sensitivity. Next, the pyroelectric sensors will be implanted into the stents using coating techniques. Finally, the efficiency of the pyro-stent is evaluated using a static methodology, ignoring the external interferences, and a dynamic methodology, simulating the blood flow and evaluating the viability in real situations. **Results:** The already prepared pyroelectric nanomaterials ZnO nanoparticles (by precipitation method) and PVDF (by solvent casting method) were characterized by FTIR and Raman spectroscopy. The next steps will involve the formulation of inks with these materials and the assembly of sensors and evaluation of their performance. **Conclusions:** The expected result is a self-powered sensor, manufactured using low-cost, easily implementable, and industrially scalable coating methods thereby improving life expectancy for patients.

Keywords: Pyroelectric Inks, Biomaterials, Smart Stents, Self-Powered Devices.

Acknowledgments

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22008 | Discharge Behaviour of Lithium Batteries

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Background & Aim: Lithium Batteries have become indispensable power sources across a spectrum of modern technologies due to their unparalleled energy density and commendable low discharge rates. However, amidst the fervour surrounding on their widespread adoption, optimizing lithium-ion batteries requires a nuanced understanding of the behaviour of the individual cells that make up these powerhouses. This imperative requires not only the accurate modelling of these cells, but also the precise identification of their relevant parameters. By subjecting these cells to controlled discharge scenarios, we have uncovered vital information regarding factors such as capacity, internal resistance, and voltage profiles at different temperatures. **Methods:** The assay methodology is based on a microcontroller as a BMS to program the current flow into the discharge board. In addition, this control also communicates with a main computer that can process all data (voltage and current rate) using Matlab. The experimental environment, as illustrated in Figure 5, has an incubator to adapt the temperature for each assay, guaranteeing a complete management system to study the dependencies of our state model in determining the fundamental parameters of the lithium battery in discharge mode. **Results:** Based on the technical specifications of the battery in study, provided by the manufacturer, we achieved the graphical curves of the cell discharge behaviour in the expected temperature range (between 5°C and 50°C). Nevertheless, the battery capacity is expected to decrease at temperatures below room temperature, while an increase is reached at higher temperatures. This phenomenon is often observed as a consequence of the thermal effects in electrochemical processes. **Conclusions:** The complete discharge profile was determined for temperatures of 10°C, room, 40°C, 50°C and 60°C. For future works, an improved long duration test is necessary to validate the battery load behaviour.

Keywords: Lithium-Ion Battery, Equivalent Circuit Model, Soc, OCV, Kalman Filter.

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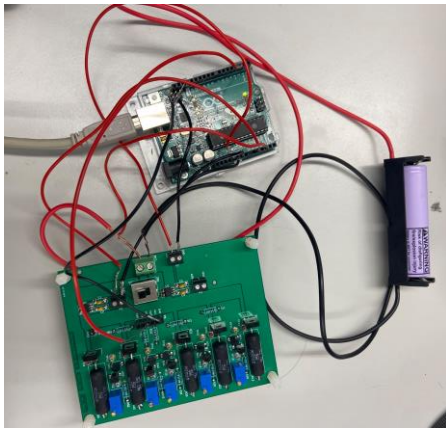


Figure 1: Discharge Board in operation.

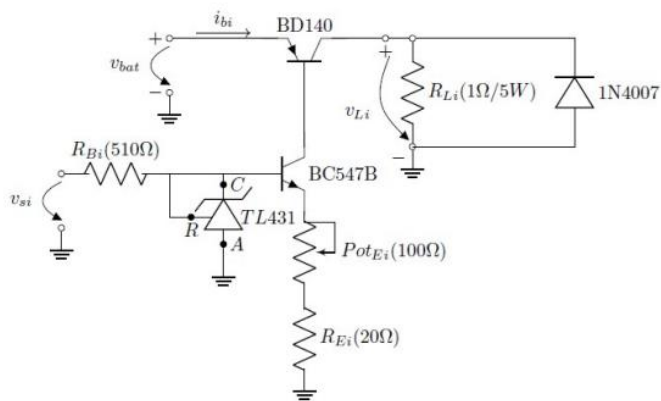


Figure 2: Schematic of one discharge module.

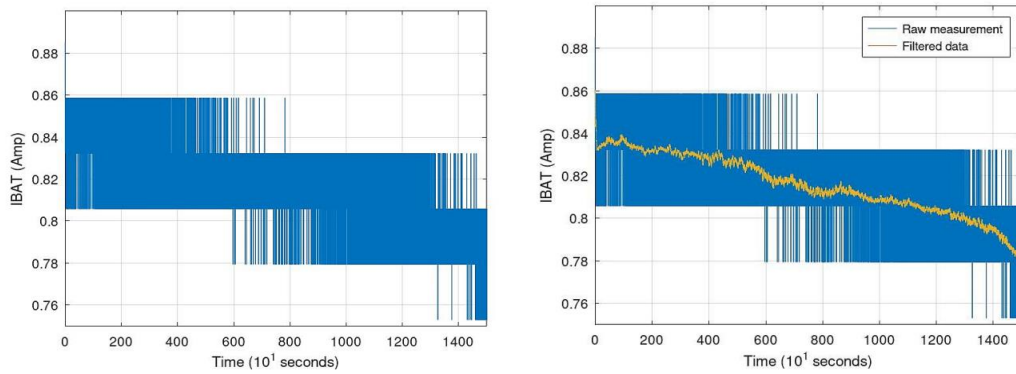


Figure 3: Discharge current between 0 and 14 ms. On the right, values filtered by the KF.

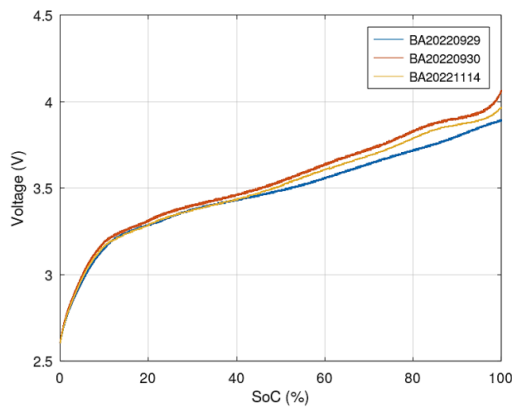


Figure 4: Discharge voltage profile to SOC for different tests carried out on the same INR18650F1L cell.

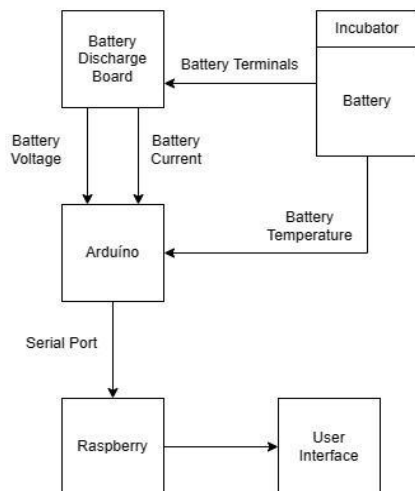


Figure 5: Experimental scheme performed. Discharge module + data acquisition system.

22044 | Mucoadhesive Nanoparticles for the Intranasal Delivery of Green Tea

Extract: A Therapeutic Strategy for Alzheimer's Disease

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‡These authors contributed equally to this work.

Background & Aim: Alzheimer's Disease (AD) is an age-related neurodegenerative disease and the leading cause of dementia worldwide. Although its cause is not fully understood, the aggregation of amyloid- β peptide in fibrils, oxidative stress, and anti-inflammatory responses are considered the main causes of the disease [1]. Since current drugs are not curative, there is an urgent need to find new therapeutic strategies. In the last decade, there has been interest in using natural compounds for the therapy of AD, as is the case with green tea [2]. Green tea contains several catechins rich in anti-amyloidogenic, antioxidant, and anti-inflammatory properties. However, most green tea's components have low bioavailability and are not able to surpass the blood-brain barrier (BBB) in efficient concentrations [3]. The intranasal delivery of drugs is a promising route to avoid the BBB and direct drugs to the brain. However, it requires the use of mucoadhesive NPs. The goal of this work is to formulate chitosan (Ch)-modified NPs for the intranasal delivery of green tea extract (GTE). **Methods:** GTE-loaded NPs composed of poly (lactic-co-glycolic acid) (PLGA) and modified with chitosan were produced using the double emulsion method. PLGA NPs were characterized using dynamic light scattering and electrophoretic light scattering. **Results:** The obtained GTE-loaded PLGA NPs showed mean diameters of 232 ± 23 nm, a polydispersity index (PDI) of 0.06 ± 0.03 , a zeta potential of -18 ± 2 mV, and an encapsulation efficiency (EE) of 43 ± 5 %. Further modification of NPs with Ch increased the NPs' size and PDI to 364 ± 37 nm and 0.20 ± 0.05 , respectively. Additionally, Ch addition increased the zeta potential of the NPs to 8 ± 3 mV. The EE of GTE-Ch-NPs was 43 ± 8 %. **Conclusions:** GTE-loaded Ch-PLGA NPs were successfully produced by the double emulsion technique, with physicochemical properties that enable their nose-to-brain transportation.

Keywords: Blood-Brain Barrier, PLGA, Chitosan, Natural Products, Catechin.

Acknowledgments

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22046 | Unravelling the potential of essential oils components to block bacterial social behaviours for infections control

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Background & Aim: The alarming growth and evolution of bacteria resistant to antibiotics leads to a decrease in the effectiveness of treatments. Besides, multi-drug resistant bacteria can thrive, communicate, and form biofilms that are even more challenging to eliminate and take most responsibility for causing infections in humans. In this project, it was studied the potential of two essential oil (EO) components (Carveol and Cis-6-nonen-1-ol) alone and combined with less effective antibiotics to interfere with bacterial pathogenicity and antibiotic resistance. To this end, their ability to inhibit bacterial communication, i.e., quorum-sensing (QS), and biofilm formation was assessed using the biosensor *Chromobacterium violaceum*. **Methods:** Firstly, the QS inhibition potential of selected EO components and the resistance profile of *C. violaceum* to a set of antibiotics were assessed by disc-diffusion assay. Then, the minimum inhibitory and bactericidal concentrations (MIC/MBC) for the antibiotics classified as resistant were determined using the microdilution method and plating in solid medium, respectively. Biofilm prevention studies were also conducted for both EO components alone and dual-combinations of EO components and antibiotics and the results analyzed in terms of biomass produced (crystal violet staining), metabolic activity (alamar blue staining) and culturability (colony forming units (CFU) per milliliters) of biofilm cells. **Results:** *C. violaceum* was most resistant to amoxicillin, oxacillin and fusidic acid. Cis-6-nonen-1-ol at $\frac{1}{4}$ MIC enhanced the antibiofilm effect of all antibiotics tested. Carveol at $\frac{1}{2}$ and $\frac{1}{4}$ MIC displayed a higher effect on the reduction of biomass production and biofilm cells inactivation than Cis-6-nonen-1-ol at $\frac{1}{4}$ MIC. **Conclusions:** Both EO components displayed antibiofilm properties and the ability to boost antibiotics action, which leads to believe that using these phytochemicals could be a promising strategy to minimize the widespread multi-resistant bacteria.

Keywords: Quorum-Sensing Inhibition, Biofilms, Antibacterial Resistance, Essential Oils Components, Antibiotics.

Acknowledgments

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22048 | Thermometry Bias in Critical Care and Impact in Downstream Machine

Learning Tasks

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Background & Aim: Contactless (infrared {IR}-based) thermometers gained popularity over contact thermometers during the COVID-19 pandemic. However, like pulse oximetry discrepancies [1,2], they may have calibration discrepancies among darker-pigmented patients. A recent study [3] showed that, as opposed to oral (contact), temporal (IR-based) measurements were associated with lower odds of identifying fever among Black compared to White patients. This miscalibration raises questions about whether thermometry may inadvertently overlook fever or sepsis cases, delaying diagnoses and exacerbating poorer outcomes among vulnerable subpopulations. Machine learning (ML) models in the intensive care unit (ICU) often incorporate features like temperature upon admission. The objectives of this work are threefold: create a derived dataset from the MIMIC-IV with paired thermometry measurements; assess the degree of thermometry measurement bias; measure and mitigate these biases' effect on downstream ML tasks. The dataset created and the code used to generate it will be made available. **Methods:** To assess bias, oral and temporal temperatures were paired from the MIMIC-IV database within 1 hour. Unadjusted and adjusted (logistic regression) odds ratio (OR) of hidden fever (at 38.3°C) were calculated for two racial groups, using reference and IR thermometry. **Results:** Among 508 patients (62 Black, 446 White), fever prevalence was 11.9% lower for Black than White patients, when using temporal thermometers. Compared to White, Black patients had significantly higher OR of hidden fever (OR=2.96, 95% confidence interval: 1.15-7.04). **Conclusions:** These preliminary findings are worrisome because they suggest potential unfairness in thermometer functionality that could increase medical disparities. Further investigation is underway to achieve a bias-informed ML model that corrects the thermometry bias in the derived subset that we created and then transfers that learning to a more generalizable mortality prediction model.

Keywords: Critical Care, Disparities, Equity, Infrared Thermometry, Temperature.

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22080 | A machine learning system for keratitis diagnosis from cornea images

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Background & Aim: Keratitis is an inflammatory corneal condition responsible for 10% of visual impairment in low- and middle-income countries (LMICs); bacteria, fungi, or amoeba are the most common infection aetiologies. An accurate and timely diagnosis of the infectious agent is crucial for the treatment option and the patient's sight outcomes. Due to the high cost and limited availability of laboratory diagnostics in LMICs, diagnosis is often made by clinical observation alone, despite its lower accuracy. The goal of this study was to develop a machine learning model that could assist in the diagnosis of the source of infection. **Methods:** A Brazilian cornea dataset was used, comprising 24,692 observations, of which 4,767 had (non-exclusive) positive results for infection (83% bacteria, 16% fungi, 15% amoeba). Two different models were investigated. The first approach consisted of three DenseNet architectures (pre-trained on ImageNet), responsible for a binary decision of each infection type. The second approach consisted of a similar DenseNet architecture used as backbone, with a multi-head classification layer for multitask learning. Balanced Accuracy (BA), F1-Score, and area under the receiver operating characteristic curve (AUCROC) were used to score the test set (10% of the data). **Results:** The highest improvement was verified in the amoeba classification, where the multitask model (BA: 0.945; F1: 0.936; AUCROC: 0.988) outperformed the single task one (BA: 0.928; F1: 0.901; AUCROC: 0.996). These findings highlight machine learning's importance in diagnosing and treating keratitis promptly, thereby reducing blindness cases. Multitask learning outperformed single-task settings in the scope of this study, but further investigation is necessary. **Conclusions:** In the future, we aim to develop a model that predicts if exams should be asked, to optimize hospital processes. Finally, we plan to explore feature disentanglement of sensitive features such as gender, thus promoting fairness across classes.

Keywords: Computer Vision, Deep Neural Networks, Keratitis, Machine Learning, Multitask Learning.

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Infection Type	# Positive Cases 4,767 (100%)	ML Task	Balanced Accuracy	F1-Score	AUC ROC
Bacteria	3,956 (83%)	Single task	0.6250	0.8930	0.7862
		Multitask	0.6104	0.8994	0.8179
Fungi	755 (16%)	Single task	0.7460	0.6029	0.9089
		Multitask	0.7501	0.5957	0.9071
Ameba	736 (15%)	Single	0.9275	0.9014	0.9957
		Multitask	0.9447	0.9362	0.9878

Figure 1: Evaluation Metrics on the test set, across different infection types, and task setup. The best results for each infection are highlighted in bold.

22098 | DigieRescueMe – Standardization and Digitalization of Rescue Education in Mining

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Background & Aim: Following European Development Plan and EU Commission the use of technological and digital devices is extremely important in all levels of education, with digitalization being one of the key targets to be reached by EU schools by 2027. According to that the integration of virtual reality (VR) simulation and 3D techniques in the propose of rescue education is extremely important, trying to keep the exploitation sites safe and educate all the workers in how to act under different circumstances. **Methods:** During the project different types of exploitation scenarios were build using Unity engine, always focusing on the safety aspect of the quarry or mine. Those games try to emerge the player in a mining ambient using 3D objects and real working sites sound, the target was to create the most realistic site scenario possible. For the learning in safety aspect, a script was designed on how to act under different circumstances, applied using the user interface (UI) in Unity. Simple questions were placed, and the player gets to choose between different possible answers; if the wrong answer is pressed, Pop-Up info will appear explaining the consequence it may cause. It also implemented first rescue procedures, such as how to do cardiopulmonary resuscitation (CPR) and using an automated external defibrillator (AED). Some of the objects used in the game, for instance, the AED, were digitalized using Peel3D and implemented in the game. **Results:** The scenario were presented to different students and professors with a big positive review in the emerging aspect but also in the technical one. **Conclusions:** It is believed that using innovative techniques and digital tools applied to the Mining Industry will not only keep the readiness level and motivation high, securing better results in safety aspects, but also creating a bigger interest in this needed area of the industry.

Keywords: Safety, Quarry, Mine, Virtual Reality, Digitalization.

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Figure 1: Quarry Scenario

Friction Pendulum Systems: A Performance-Based approach

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Background & Aim: Friction Pendulum Systems (FPS) have been widely deployed in the context of seismic base isolation. By counteracting any horizontal movement into vertical weight uplift through a pendulum-type response, these seismic isolators develop restoring forces, most widely known as self-centring capability, that allows the device to passively reposition itself to its centre of equilibrium after an imposed action. This is of high interest for structural engineers as structural deformations can be taken into account by these devices, lowering reactions on structural supports. Nevertheless, FPS tend to develop accrual displacements overtime, and, in certain design conditions, re-centring must be controlled in order to meet project specific requirements. These can be controlled through the implementation of other isolation methodologies at the expense of a higher project cost, leading the way for the development of other solutions that resolve this issue within the device itself. With this study, it is aimed to show that accrual displacements can be controlled in specific design scenarios to achieve design requirements criteria the horizontal inclination of the support where FPS are installed. **Methods:** To prove this, a performance-based approach was envisioned through a kinematic model that was developed and calibrated through Non-Linear Time-History analysis, being further applied to the context of a cargo railway bridge, where performance-based criteria needed to be met for seismic actions and railway braking force. **Results:** Results show that inclinations up to 1% and smaller prove to be sufficient to ensure that project specific criteria are met under a performance-based approach. **Conclusions:** With this work, it has been shown that base inclination can be a performance-based approach that ensures specific project requirements are met.

Keywords: Friction Pendulum Systems, Performance-Based Design, Seismic Isolation, Re-Centring, MAURER SIP-Adaptive.

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22133 | Sulphide Mine Waste Valorisation

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Background & Aim: Today, mine waste streams from different sources are often disposed of in a common facility, for simplicity of the waste treating processes, but this does not take into account the different geochemical, geotechnical, and mechanical behaviour that might be exhibited by mine waste streams (release of toxic and reactive elements, geotechnical instability, etc.). The current disposal practices can constitute a risk to the environment and human health and might well result in costly measures when closing a disposal facility [1, 2]. The potential transformation of mining wastes into resources contributes to the reduction of wastes to be disposed of. This work aims to assess the potential for the use of sulphide mine wastes in construction materials or products. **Methods:** The mine waste will be characterized for physical and chemical parameters such as grain size distribution (technique of laser diffraction), chemical elemental composition (X-ray fluorescence), specific gravity (pycnometer technique), particle shape, and roughness (through image analysis and microscope analysis). The chemical stability will also be analysed through natural leaching tests (static and kinetic leaching tests) as well as the mechanical properties such as compression and flexural strength. **Results:** The characterization will allow us to demonstrate whether a mine waste can be reused as e.g. supplementary binder to cement or if proper stabilization from a geotechnical and/or geochemical perspective should be developed for disposal strategies. **Conclusions:** When compared with mostly silicate granular materials used in construction, mine wastes (tailings) show similar grain size distribution, but exhibit significantly different mechanical behaviour, in particular in what concerns consolidation. Therefore, it is essential to know the characteristics of the mine wastes and their long-term behaviour when considering their use as construction materials or products. This work is ongoing.

Keywords: Sulphide Mine Wastes, Circular Economy, Valorisation, Construction Materials.

Acknowledgments

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ENVIRONMENT

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21454 | Impact of particle size on the extraction of tannins from chestnut shells aiming a coagulant production

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Background & Aim: Ensuring clean water and sanitation is one of the 17 goals for sustainable development outlined by the UN. Drinking water is becoming scarce due to excessive use and pollution, and the development of sustainable treatment methods is crucial. Tannins can be used to produce natural coagulants for WWTP, offering benefits like biodegradability, reduced sludge production, and effective performance over a wider pH range [1]. Portugal is one of the biggest chestnut producers, and the shells are usually applied in energy production or as fertilizer [2], but with potential for valorisation. **Methods:** Tannin extraction is the first step for the coagulant production. This study aims to determine if the particle size influences the extraction yield (EY) and total phenolic content (TPC) in the extraction of tannins from chestnut shells using the solid-liquid extraction (SLE) method. SLE was carried out at 90 °C, with a liquid-to-solid ratio of 50 mL/g, for 10 min. Three different particle sizes were studied: larger, medium, and smaller (>1.18 mm, <1.18 mm, and <0.425 mm, respectively). The EY was determined using a mass balance equation, comparing the initial (pre-extraction) and final (post-extraction) materials [2], and the total phenolic content was determined through the Folin Ciocalteu method [3]. **Results:** The EY varied across all particle sizes, ranging from 9.8±0.1% to 12.9±0.9% for larger to smaller particles, while the medium ones yielded 13.1±0.7%. The TPC in the liquid extract was 198±1, 245±32, and 355±40 mg-GAE/L, and in the dried extract was 169±20, 153±14, and 229±30 mg-GAE/g-E, for larger, medium, and smaller particles, respectively. **Conclusions:** The results indicate that particle size influenced EY and TPC since smaller particles yielded better outcomes. Considering the objective of extracting tannins for coagulant production and both EY and the quality of the extract (characterized by TPC), it is possible to confirm that smaller particle sizes are the best for this purpose.

Keywords: Tannin-Based Coagulants, SLE, Particle Sizes, Tannin Extraction.

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21463 | Bioprospecting for cellulose-degrading microorganisms

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Background & Aim: Cellulose, a complex polysaccharide, is one of the main components of plant and algae biomass and therefore the most abundant polymer found in nature, serving as a significant carbon source in various ecosystems. Bioprospecting for cellulolytic microbes is a promising strategy for discovering potential biocatalysts for the hydrolysis of lignocellulosic materials, including residues. This work aims to assess the cellulolytic potential of microbial isolates (bacteria and fungi) sourced from diverse environments and to establish a synthetic microbial consortium capable to enhance the management of cellulosic waste. **Methods:** The experimental approach encompasses biodegradation assays coupled with optimized colorimetric methods, to estimate cellulose consumption (Congo Red assay) and the concomitant production of oligomeric/monomeric sugars (Dinitrosalicylic acid assay). For bacterial strains, these biodegradation assays involve batch incubations in minimal liquid medium supplied with cellulose as the sole carbon source, while solid medium is being used for fungi. Both assays are being run under mesophilic temperatures (28-30 °C) and aerobic conditions. Upon achieving a final selection, strains exhibiting the best cellulose degradation performances will be assembled into a synthetic consortium that will be evaluated for their cellulose degradation capability. Future steps will also include phylogenetic identification of the cellulose degrading isolates through 16S and ITS rRNA gene sequence analysis. **Conclusions:** This study has the potential to identify novel cellulolytic microbes, highlighting the substantial role microorganisms play in ecosystem processes and their diverse applications in biotechnology.

Keywords: Cellulolytic Microorganisms, Biodegradation, Biotechnology, Waste management.

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21533 | The ecotoxicological effects of metformin in aquatic standard species, in a climatic change scenario

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Background & Aim: Metformin (MET) is the most frequently prescribed antidiabetic drug for the oral treatment of Diabetes type-II mellitus, with an increase in diagnostics in the last decades. Consequently, substantial amounts of MET are discharged into the environment, resulting in significant concerns due to its potential adverse effects on human health and ecosystems. Amidst growing concerns about the toxic effects of pharmaceutical contaminants on aquatic ecosystems, there is an urgent need to prioritize understanding their interactions with the impacts of climate change (e.g. increased temperature). This study aims to evaluate the ecotoxicological effects induced by MET in different aquatic standard species, considering the prediction of an increase in the global average temperature. **Methods:** *Raphidocelis subcapitata* growth inhibition (3 days; 0.00 to 1000.0 mg MET/L) and *Lemna minor* growth inhibition assays (7 days; 0.00 to 200.0 mg MET/L) were performed, at 24 ± 1 °C (OECD guidelines) and 28 ± 1 °C (worst-case IPCC scenario), following OECD guidelines. **Results:** Low toxicity of MET for the microalgae was observed ($EC_{50} > 100$ mg/L). The results showed that MET induced significant effects in the growth of *L. minor*, with an EC_{50} (24°C) = 50.8 mg MET/L and an EC_{50} (28°C) = 45.8 mg MET/L. A significant decrease in fronds and fresh biomass was observed along with metformin concentration for both temperatures, being noticeable for 28°C exposure at the lowest concentration tested (24.52 mg MET/L). Biochemical biomarkers showed MET effects at the cellular level in terms of oxidative stress (antioxidant defense activities increased) and pigments, in *L. minor*, at both temperatures. **Conclusions:** Metformin demonstrated hazard to *Lemna minor* with its adverse effects heightened in response to an increase in temperature. Further studies will be carried out on other aquatic organisms to obtain more data to recognize the potential effects of MET in a climatic change scenario, in aquatic ecosystems.

Keywords: Pharmaceuticals, Global Warming, Ecotoxicological Studies.

21620 | Optimization of conducting glass substrates for photoelectrochemical devices

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Background & Aim: Solar energy is one of the most promising renewable energy sources for meeting the global energy demand, but its intermittent nature requires smart storage solutions[1-3]. The photoelectrochemical (PEC) water-splitting technology will play a central role in the production of low-cost green-hydrogen. It uses semiconductor-based photoelectrodes (PEs) to promote the solar-assisted oxidation and reduction of water in a single device[4]. Despite the promise of this technology, scaling up PEC cells faces some important challenges, namely the high ohmic losses imposed by the transparent conducting oxides (TCO) commonly used as current collectors on glass substrates[5]. This work aims to explore new strategies to increase PEC cell efficiency and compensate for scale-up losses. **Methods:** The ultrasonic spray pyrolysis (USP) and photolithography was used to produce PE substrates with high surface area and good electrical conductivity. Higher surface areas were achieved by micro-structuring the glass substrate through laser ablation and chemical etching techniques. Relevant experimental parameters were optimized to maximize surface area, assessed using UV/Vis spectroscopy, morphological analysis (SEM) and cyclic voltammetry (roughness factor estimation). Finally, a TCO film was sprayed onto the substrates to further improve the electrical conductivity. The most promising ones were selected and coated with a thin-film of hematite (using USP) and the PEC performance for water oxidation was evaluated through *J-V* characteristic curves. **Results:** A photocurrent density of *ca.* 0.74 mA·cm⁻² (at 1.45 V_{RHE}) was recorded, 16 % higher than the one observed for hematite films deposited in regular planar substrates. **Conclusions:** These results demonstrate that the combination of photolithography, USP, and micro-structuring techniques successfully produced TCO-glass substrates with high surface area and conductivity. When tested in a hematite-driven PEC cell, these substrates showed improved efficiency.

Keywords: Photoelectrochemical Cell for Water Splitting, Green-Hydrogen, Transparent Conducting Oxide, Hematite, Ultrasonic Spray Pyrolysis, Scale-Up.

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21697 | Cork powder biochar in a holist approach for the treatment of textile wastewater

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Background & aim: In the past few years the textile industry has been growing more and more, due to the increase in population and growing pressure from the fashion industry. As a result, there is a greater impact on water resources and water consumption in the various manufacturing processes producing water with a huge variety of chemical products, including heavy metals and synthetic dyes that are difficult to remove. Therefore, in order to promote the removal of these compounds, different technologies are used, including coagulation/flocculation and adsorption. The latter has the advantage of its simplicity, low sludge production and cost-effectiveness. As a way of solving this problem, the adsorption of dyes and heavy metals by biochar obtained from cork industry waste was tested, in order to make use of a product with no commercial value. **Methods:** Different biochars were obtained at different temperatures and with the use of different burning gasses were analysed. These were obtained after washing and drying the cork powder, which allows the production of an extract rich in phenolic compounds with various possible applications and a cork powder pomace to be used for biochar production using temperatures of 600 °C, 700 °C and 800 °C and different combinations of gases such as nitrogen and carbon dioxide for 4 h [1,2]. **Results:** The results obtained indicate a correlation between increasing temperature and enhanced surface area, leading to improved adsorption capabilities. Additionally, the use of carbon dioxide resulted in further surface area enhancement, consequently increasing the removal efficiency of colour and certain metals present in the tested effluent. **Conclusions:** It can be concluded that the use of cork powder was effective in treating effluent and increased its yield at higher temperatures, reducing waste in the cork industry.

Keywords: Textile Industry, Cork Powder, Wastewater Adsorption.

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21776 | Carbon Dots from sustainable precursors

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Background & Aim: Carbon Dots (CDs) are fluorescent carbon-based nanomaterials [1]. Some of the most important properties of these nanomaterials are their strong luminescence, good water solubility, physical-chemical and photochemical stability, biocompatibility and low toxicity [2]. Due to these properties, the scientific community has explored several applications such as in sensors, LEDs, bioimaging, phototherapy, and drug delivery [2]. The environmental sustainability of CDs is a crucial matter since their fabrication stage has been identified as of environmental concern [3]. Previous studies have identified the carbon precursor as the main hotspot for environmental impacts in CDs synthesis [4]. Our approach intends to add a sustainable carbon precursor reducing the chemical reagent following a circular economy. Thus, we aim to synthesize multicolour CDs for application in LEDs. To obtain white LEDs with higher quality it is necessary to have blue, green and red emissions in order to obtain these three components of the light spectrum. **Methods:** CDs were synthesized following a hydrothermal procedure using corn stover and citric acid as carbon precursors and ethylenediamine as nitrogen dopant. Photoluminescence properties of CDs were characterized by fluorescence spectrometry and UV-vis absorption spectrometry. Considering the application for white LEDs it was also evaluated CDs efficiency through photoluminescence quantum yield. **Results:** Preliminary results show that by increasing the amount of carbon precursors or changing the solvent, there is a modification in the emission colour of CDs. According to the literature by changing the solvent to dimethylformamide and formamide it is possible to achieve green and red CDs [5-6]. **Conclusions:** Thus, this work intends to develop green and red emission CDs using sustainable carbon precursors (corn stover or other organic waste) to achieve LEDs more environmentally friendly and with higher quality.

Keywords: Carbon Dots, Hydrothermal Approach, Leds, Green Precursors.

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21781 | Crosstalk between adaptation and detoxification in pinnipeds: genomic insights for hazard assessment

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Background & Aim: Pinnipeds (seals, sea lions and walruses) are a clade of aquatic mammals, which are endangered due to anthropogenic pressures (e.g. water pollution) [1]. Many chemical compounds have been identified as concerning pollutants, or xenobiotics, in aquatic systems leading to several negative effects on marine mammals' health: e.g. impairing their immune responses and reproduction [2]. Pinnipeds, as one of the top predators in the trophic chain, are exposed to higher concentrations of these chemical substances [2]. Xenobiotic metabolism is a physiological process that results in the biotransformation of chemicals resulting in their inactivation and excretion from the organism. The Pregnane X Receptor (PXR) and Constitutive Androstane Receptor (CAR) are nuclear receptors, activated by a wide variety of xenobiotics, which are responsible for the transcriptional regulation of genes encoding enzymes involved in the biotransformation of xenobiotics. Interestingly, within marine mammals, polar bear PXR was shown to have a narrower ligand specificity when compared to human PXR [3]. Also, previous studies reported the complete inactivation of PXR and CAR genes in cetaceans, paralleling their transition to a fully aquatic environment and carnivory [4]. With this in mind, the current study aims to retrieve and characterize the PXR and CAR genes in all pinnipeds, using *in silico* tools.

Methods: PXR and CAR sequences will be scrutinized to evaluate evolutionary rates, as well as the overall conservation of protein sequences and to produce 3D homology models for ligands screening using molecular docking tools [5]. **Results:** Preliminary results show that PXR is not pseudogenized in pinnipeds, unlike in Cetaceans; yet, they suggest divergence when compared to humans. **Conclusions:** This study will contribute with new information regarding the susceptibility of pinnipeds to xenobiotics, contributing to the development and implementation of better conservation policies for these species.

Keywords: Nuclear Receptors, Marine mammals, Xenobiotics.

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21804 | Unveiling the plant growth promoting traits of different microorganisms to enhance saltmarsh plant growth and endurance during phytoremediation trials

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Background & Aim: Estuaries and their saltmarsh areas are ecosystems with high ecological value, not only providing unique conditions to harbour different species but also playing an important role in pollution mitigation. Salt marsh plants such as *Phragmites australis* are essential for the removal of a wide range of pollutants, either through stimulation of rhizosphere microbial communities or the uptake, translocation, and accumulation in both belowground and aboveground tissues. The interactions between the bacterial community from the plant's rhizosphere are crucial for the plant tolerance to abiotic stress and to promote the efficient removal of pollutants from the soil. Some of these bacteria are able to produce compounds or solubilize essential nutrients (known as plant growth promoting traits (PGP)), that are essential for the plant. The aim of this study is to evaluate the (PGP) traits of 41 bacterial strains, previously isolated from enriched cultures with copper and venlafaxine, using rhizosediments from *Phragmites australis* as inoculum. **Methods:** For that, six assays will be assessed through screening methodologies on solid media substrates: phosphate solubilization [1], nitrogen fixation [2], siderophore production [3,4] and ACC deaminase activity [7]. The indole acetic acid (IAA) and the biofilm produced by the bacterial isolates will be measured using a colorimetric technique [5,6]. **Results:** So far, 23 from 41 bacterial strains were tested for phosphate solubilization capacity, in which 4 bacterial strains presented positive results (clear halo surrounding the inoculum). Among the remaining isolates, 9 were characterized as 'negative with growth' (colony grew without P-solubilisation, non-appearance of a transparent halo). In the nitrogen fixation test, 11 bacterial strains were tested, where 8 have tested positive (showing growth). **Conclusions:** This study will unveil the PGP traits of 41 bacterial strains isolated from salt marsh rhizosediments, highlighting their potential to be incorporated in phytoremediation trials. The best performing bacterial strains will be combined in a bacterial

consortium, to develop plant-bacteria systems that enhance the removal of mixed pollution from estuarine sediments.

Keywords: Salt Marsh Plants, Plant Growth-Promoting Traits, Bacterial Strains, Phytoremediation.

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21809 | Exploring bioremediation potential of microorganisms isolated from estuarine sediments for biodegradation of an antidepressant pharmaceutical

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Background & Aim: Pharmaceuticals are essential to our society to treat several diseases. However, their intensive consumption has led to their presence in different environmental compartments. Faced with a mental health crisis, pharmaceuticals that are used to treat depression and anxiety such as fluoxetine (*e.g.*, Prozac®), diazepam and paroxetine (Prx) have been detected in environmental matrices at different concentrations [1][2]. Bioremediation, using microorganisms with the metabolic capacity to degrade target pollutants, can be presented as a suitable alternative to recover impacted environments. **Methods:** This work aims to study the bacterial degradation of Prx, a fluorinated antidepressant, using 22 bacterial strains isolated from a previous Prx enrichment experiment, using estuarine sediment as inoculum. For that, each strain will be exposed to Prx in axenic conditions, to unveil the degradation potential of each. Moreover, a bacterial consortium will also be assembled, using the bacterial strains with the best degradation traits, to assess if a bacterial consortium can enhance the biodegradation process. To achieve that, each bacterial strain will be inoculated, in triplicates, in 60 mL of mineral salts medium, and doped with 1 mg L⁻¹ of Prx, and 500 mg L⁻¹ of the most suitable carbon source (co-substrate). The best co-substrate will be determined by growing each bacterial strain in the presence of 500 mg L⁻¹ of peptone, yeast extract and sodium acetate, during five days, measuring the optical density at 600 nm. The experiments will be conducted for 4 weeks, in static and dark conditions. The removal efficiency of Prx will be evaluated by High-performance liquid chromatography coupled to diode array detection (HPLC-DAD), and its defluorination will be estimated from the release of fluoride anions, using a fluoride ion selective electrode.

Conclusions: This work will unveil the potential of several bacterial strains, previously isolated from a Prx-enriched culture, to degrade the target pharmaceutical, to further develop bioremediation tools for the recovery of natural environments.

Keywords: Bioremediation, Paroxetine, Bacterial Degradation Potential.

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21840 | Optimization of DNA Extraction Methods for Metagenomic Analysis in Surface Water Samples

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Background & Aim: Metagenomics is vital for studying microbial communities, shedding light on ecosystem dynamics and biodiversity. However, microbial DNA extraction is a challenge, namely when dealing with environmental samples. We aimed to optimize DNA extraction from water and sediment samples of different rivers used for drinking water production to obtain high-quality DNA for metagenomics analysis. **Methods:** The tested samples included 28 water and 29 sediments from 6 rivers of North of Portugal (10-months/2022-2023). At the same day of sampling, water (450-900 ml) was filtered through a 0.22µm nitrocellulose membrane (450 ml per membrane). The sediments varied in the type of texture and water in turbidity. Membranes and sediments were stored at -80°C before DNA extraction using the DNeasy PowerSoil kit (Qiagen) with standard or modified conditions (e.g. increasing sample amount-SA or temperatures adaptation-TA and time extension-TE in lysis steps). The aim was to obtain a yield of >20ng/µl (>1000ng) and a DNA/protein 260/280 ratio of 1.6-2.5 (NanoDrop spectrophotometer) required for sequencing. PCR of 16S rRNA gene was done to confirm DNA extraction in test samples and in negative controls to exclude contaminations. **Results:** Standard protocol conducted to DNA concentrations of 28-40 ng/µl (260/280>1,6/>1000ng) for only 2 water and 2 muddy sediments, with all other samples having concentration of 0-10 ng/µl. With protocol modifications required DNA concentrations and quality was obtained with TE+TA (n=26 of water; n=23 of muddy sediments; 21-85ng/µL) and TE+TA+SA (n=4 of sandy sediments; 25-140ng/µL). The DNA of 23 samples, including of 19 under protocol modifications, were sent for outsourced sequencing services, all passing quality control. Negative controls did not amplify the 16S RNA gene. **Conclusions:** Unique characteristics of environmental samples may influence

the amount and quality of microbial DNA extraction for metagenomics, which can be easily overcome by few modifications in commercial kits protocols.

Keywords: Metagenomics, Environmental Samples, Dna Extraction.

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21897 | Ozone Sidestream Technology for the Pre-Oxidation of Water for Human Consumption

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Background & Aim: Ozone is a powerful oxidant and strong disinfectant that rapidly reacts with contaminants and pathogens, providing safe and aesthetically pleasing water. A sidestream ozone injection system based on a novel design of a pressurized micro/meso-structured NETmix static mixer has been developed for the pre-oxidation of freshwater for human consumption, Figure 1. **Methods:** A fraction of the main water flow was directed into the NETmix unit and efficiently mixed with an ozone gas stream generated by a corona discharge ozonizer. Thereafter, the stream exiting the NETmix is rapidly blended into the main water flow utilizing re-entrant mixing nozzles in the pipeline, enabling a rapid blending of the O₃ enriched sidestream with the main plant flow, providing the stable dissolved O₃ residual required to obtain the oxidation/disinfection credits in the contact/reaction chamber. The system was installed at Lever water treatment plant, making possible the direct comparison with the full-scale sidestream system using a Venturi injector. **Results:** Various conditions of operating pressure and applied ozone doses ranging from 0.8 to 1.3 g m⁻³ were tested, unraveling a potential for lower ozone dosage requirements to achieve appropriate water disinfection/oxidation and maximize the subsequent coagulation/flotation treatment unit. **Conclusions:** When integrated as a basis of a sidestream ozone injection system, the NETmix technology has demonstrated a powerful capability for a high degree of ozone(gas)-water mixing, thus enabling an alternative to systems using Venturi injectors. As a consequence, the herein proposed technology has been proven effective for pre-oxidation of freshwater, successfully promoting the disinfection in addition to facilitating the removal of organic matter in the water treatment process.

Keywords: Water treatment, Ozonation, Ozone injector Systems, NETmix.

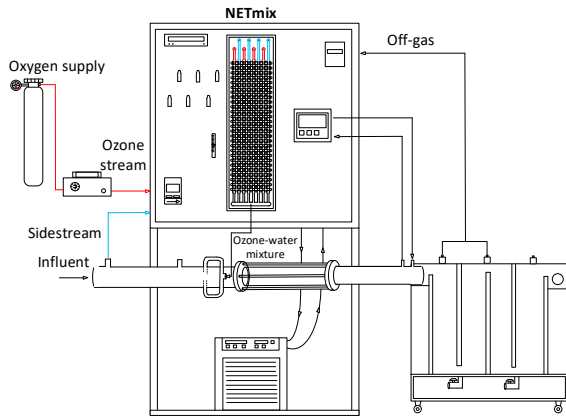


Figure 3 - Scheme of the sidestream ozone injection system.

21908 | Optimization of Antioxidant Extraction from Seaweed Using Design of Experiments

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Background & Aim: Seaweed is a promising nutritional source, rich in proteins, vitamins, polysaccharides, lipids, pigments, essential minerals, and antioxidants. It produces various biologically active compounds for fertilizers, animal feed, and human food [1]. This work aims to investigate the antioxidant properties of 8 commercially available algae species (*Eisenia bicyclis*, *Himanthalia elongata*, *Undaria pinnatifida*, *Codium tomentosum*, *Ulva lactuca*, *Chondrus crispus*, *Palmaria palmata* and *Porphyra dioica*) for food application. **Methods:** Algae were extracted using the solid-liquid method with 40 mL of ultrapure water as the solvent. The experimental design tool "Design Expert 11" was used to obtain two matrices, "Central Composite Design" and "Box-Behnken," for selecting the optimum extraction conditions (temperature, time, and ratio). Antioxidant analysis methods such as ABTS, FRAP, and TPC were performed. **Results:** Based on the statistical analysis in Design Expert 11, values with a p-value of less than 0.05 were selected. For TPC, higher temperatures (75°C), biomass extraction ratio of 75%, and 1–3 h extraction time resulted in higher values, as observed in *E. bicyclis* (20.04 mgGAE/g) and *H. elongata* (9.22 mgGAE/g). In FRAP, high temperatures (75°C), moderate biomass ratio (25%), and higher extraction times (3-5h) showed greater capacity to reduce ferric ions, exemplified by *E. bicyclis* (307.74 mgAAE/g) and *H. elongata* (102.30 mgAAE/g). As for ABTS, the best results were obtained with moderate temperature (43-75°C), high biomass ratio (25-74%), and moderate extraction time (1-3h), as shown by *H. elongata* (96.35 ugTE/g) and *E. bicyclis* (52.87 ugTE/g). **Conclusions:** This study emphasizes the varying antioxidant capacities of seaweed, stressing the necessity for advanced methods like HPLC to pinpoint and measure specific antioxidants in various algae species. It also shows their promise for natural antioxidant products, including functional foods, dietary supplements, cosmetics, and pharmaceuticals.

Keywords: Seaweed, Box-Behnken, Central Composite Design, Antioxidant Extract, Food Application.

Acknowledgments

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21920 | Validation of an LC-MS/MS method for the monitorization of antifouling booster biocides in *Mytilus* spp

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Background & Aim: Marine biofouling, which occurs when unwanted organisms accumulate on submerged surfaces, is a problem that leads to problems like increased fuel usage, higher maintenance expenses, and accelerated corrosion on ships. To address such issues, antifouling (AF) paints are used. Diuron, Irgarol 1051, DCOIT, and tralopyril (ECONEA) are biocides that have been used in AF products after the global ban of tributyltin (TBT) in 2008. However, due to their toxicity and persistence, Diuron and Irgarol 1051 have been phased out in several countries, including those in the EU. DCOIT and tralopyril, on the other hand, have been approved by the Biocidal Product Regulation and are currently used in AF paints. This study aims to validate a methodology using SPE-LC-MS/MS for assessing the environmental levels of AF booster biocides, such as Diuron, Irgarol 1051, Dcoit, and Tralopyril in *Mytilus* spp. **Methods:** The LC-MS method was developed with a mixture standard of the four target compounds, showing good validation parameters such as linearity, precision, and sensibility. We are now in the process of the method validation, using Mussel as the matrix while following the International Committee Harmonization (ICH Q2 (R2)) validation guidelines. Mussels were collected from Porto de Leixões harbour, soft tissue lyophilized, and crushed with liquid nitrogen. Samples (0,5g) were extracted in a methanolic solution (95%), sonicated (ice bath, 10% amplitude, 5 min), and centrifuged (5000 g, 1 min, 4°C). Extracts were cleaned and concentrated using HLB Solid Phase Extraction before running the matrix in LC-MS. **Results:** The method showed to be linear ($R^2 > 0,99$) for all the AF booster biocides compounds in a range of 10 to 1000 ng/mL. Limits of detection were in a range of 23 to 31 ng/mL and Limits of quantification from 71 to 96 ng/mL. The diluted standard mixture was stable for at least 48 hours at room temperature (precision > 15%). All the conditions are now being applied in mussel extracts treated by HBL-SPE. **Conclusions:** This work will provide a better understanding of the presence of these molecules in macrofouling organisms using a validated LC-MS method.

Keywords: Antifoulants, Environmental Risk Assessment, Biocide, Mussel, LC-MS/MS.

21935 | Combining Soil and Satellite Remote Sensing variables with climate data aids the conservation of the Iberian endemic *Juniperus navicularis* Gand. (Cupressaceae)

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Background & Aim: The genus *Juniperus*, an integral component of semi-arid and mountain ecosystems across the northern hemisphere, exhibits a broad but scattered distribution within the Cupressaceae family. Within this genus, *Juniperus navicularis*, is endemic to the Iberian Peninsula and highlights the peculiar biogeographic characteristics of the Iberian Southwest as a phylogeographic hotspot for the Genus. The species thrives in the sandy coastal landscapes of Portugal and similar areas in Spain, being classified as Near Threatened in the global context (IUCN). This study aims to use Species Distribution Models, as base to combine soils parameters and remote sensing variables, with climate data to analyse *Juniperus navicularis* current and potential distribution in the Iberian Peninsula, in way to help practitioners and conservation planning. **Methods:** Models were run for 8 subsets of bioclimatic variables with a correlation of <0.75. **Results:** The highest performance model (TSS=0.955) revealed the influence of annual temperature range (BIO07) and the absence of winter cold in the species' distribution, where precipitation seasonality and summer drought (BIO14,15) emerge as significant variables. Additionally, topographic and soil variables were integrated into the modelling process, generating a more complete species distribution model and detailed ecological niche. **Conclusions:** This modelling exercise proved to be useful and gives significant information about an endemic *Juniper*, that can be used to anticipate future range shifts and conservation planning of a forest species related with cork oak (*Q. suber*) understory dynamics alongside the neighbouring Oak forests, improving our knowledge about these species' responses to climatic worsening scenarios in an important biome for plant diversity like the Mediterranean Basin.

Keywords: Ecological Modelling, Biodiversity Conservation, Remote Sensing, Junipers, Mediterranean Forests.

21943 | Determination of Vitamin C content in spinach plants grown under the use of cyanobacteria biomass as fertilizer

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Background and aims: The agricultural sector is continuously exploring sustainable and innovative approaches to enhance crop productivity, driving the quest for *greener* alternatives over synthetic fertilizers. Cyanobacteria have been reported as a promising agricultural fertilizer, with positive effects on crop yield [1]. However, little is known about its potential effects on the produced vegetables' nutritional quality. Studies have documented that exposure of plants to cyanobacterial crude extracts stimulates the production of enzymatic and non-enzymatic antioxidants. Vitamin C, a non-enzymatic antioxidant, plays a crucial role in protecting cells from oxidative stress and spinach is known to be relatively high in vitamin C compared to other vegetables. The purpose of this study was to determine the content of vitamin C in spinach plants grown under the use of cyanobacterial biomass as fertilizer. **Methods:** Spinach plants were tested in soil, under six different conditions: (i) control, (ii) commercial chemical fertilizer, cyanobacterial biomass (iii) non-cyanotoxin producer, and cyanotoxin producer of (iv) Anatoxina (ANA), (v) Microcystin (MC), and (vi) Cylindrospermopsin (CYN). The analysis of vitamin C in spinach plants was performed according to EN 14130:2003 [2]. **Results:** The results showed an increased content of vitamin C in all exposed groups when compared to the control (37 mg/Kg), with statistical differences in the conditions exposed to MC (56 mg/kg), ANA (76 mg/kg), and CYN (114 mg/kg). The results suggest that the rise in vitamin C may be related to a plant defence mechanism against oxidative stress potentially generated by exposure to cyanotoxins. **Conclusions:** Although the antioxidant content in spinach plants can be enhanced as a mechanism to cope with oxidative stress, prolonged exposure may increase plants' susceptibility to accumulate cyanotoxins, which may pose a risk to human health. Additional studies are

needed to understand all the positive and negative effects of using cyanobacteria biomass as a biofertilizer.

Keywords: Cyanobacterial Biomass, Fertilizer, Non-Enzymatic Antioxidants, Nutritional Value, Vitamin C.

Acknowledgments

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21952 | Bioclimatic and Potential Natural Vegetation (PNV) analysis aids the restoration of Cabeceiras de Basto Native Forests

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Background & Aim: PNV and associated concepts have been proven useful for many years, offering guidelines for best practices for conserving nature within the framework of land-use planning. The concept and its understanding can be ideally combined and compared with real vegetation maps, infrastructure planning and land evaluation for forestry and agricultural management, revealing its extreme usefulness for ecological restoration. As it offers a framework of data about the area (pool of communities, and environmental elements) it can be used for sustainable management and is essential to landscape analysis and precisely defining biogeographical units. This work aims to help in the reforestation of areas that were lost to forest fires, alien invasive species, through the recovery of the native autochthonous vegetation, to create native habitats pools by using native plants and to implement a study for the reforestation of an allocated study-plot. The study area is Cabeceiras de Basto municipality, located in the northern interior of Portugal, in the Minho region, and the allocated plot is in the union of parishes of Gondíães and Vilar de Cunhas. The municipality of Cabeceiras De Basto have 24180ha with 9654,7ha of forest area, which represents 40% of the total area. One of the biggest factors that defines the actual flora is its high precipitation and humidity, giving to the municipality by the surround mountains. **Methods:** We combined geobotanical analysis with bioclimatic predictors to infer PNV in the area and segregate distinct forest association types related with three dominant and better adapted trees to the bioclimatic variables. These are the Galician oak (*Q. orocantabrica*), Iberian white birch (*Betula celtiberica*) and the Pyrenean oak (*Q. pyrenaica*), distributed across the gradient of Mediterranean vs temperate areas and colder areas related with higher altitudes and higher rainfall. The three will have a companion-species cast of other trees and pre-forest shrubs that are characteristic of each forest association. Some climatic envelopes were also used to infer the presence of particular plant communities with rare and

important species, like *Prunus lusitanica* and *Vaccinium myrtillus*, by crossing hiperhumid areas with absence of extreme low winter temperatures (low mesotemperate). **Results:** The study-plot was situated in the transitional areas between two major bioclimatic units (supratemperate vs mesotemperate) and we developed a strategy of mixed forests, always taking in to account the understory with local importance in terms of traditional uses (ex: heathlands for honey production and grasslands for hunting). **Conclusions:** This work served the propose of aiding natural vegetation recover, and stablishing a first local (Cabeceiras de Basto Municipality), strategic and biogeographic sectorized plan for restoring the local forests, beside the more important habitats for the area.

Keywords: Reforestation, Biodiversity Conservation, Habitat Restoration, Mediterranean Forests.

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21976 | Nitrous oxide emissions and *nosZ* genes abundance in soil samples from an oak plantation and a puddle

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Background & Aim: Soil is the dominating source for atmospheric nitrous oxide (N₂O), and this is a potent greenhouse gas with a global warming potential almost 300 times higher than carbon dioxide (CO₂). Moreover, N₂O is presently the most significant ozone-depleting gas and it is expected to remain the largest throughout the 21st century. Additionally, N₂O cannot be sequestered like CO₂ in biomass or soil. Therefore, the only way to reduce atmospheric concentrations of N₂O is to reduce its emissions. This work aimed to evaluate the potential N₂O emissions in samples collected from two different soils in the city park of Porto. We aim to understand the potential impact of these two types of soils in N₂O emissions. **Methods:** Oak plantation and puddle soil samples were collected at two depths (0-2 cm and 3-5 cm). N₂O production rates were evaluated after an anaerobic incubation in sealed serum bottles with NO₃⁻ supplementation. Nitrous oxide emissions were quantified by using an electron-capture gas chromatograph (GC-ECD), by collecting gas samples over time (1 h, 2 h and 3 h of incubation). In the same samples, the abundance of *nosZ* gene, crucial for N₂O reduction, was evaluated by isolating the soil DNA and quantifying the *nosZ* gene using Quantitative Real time-PCR. **Results:** Results showed consistently higher N₂O production in the soils collected at oak plantation, in comparison with the muddy soils collected at a puddle. Quantitative Real time-PCR of the *nosZ* target gene showed higher relative abundance of *nosZ* gene in puddle soil when compared with the oak soils. **Conclusions:** These preliminary results may show more efficient denitrification in the puddle soil, given to the lowest N₂O emissions when compared with oak soil. This more efficient soil denitrification can be supported by the greater abundance of the *nosZ* gene observed in the microbial community present in the puddle soil.

Keywords: Denitrification, N₂O Emissions, *NosZ*, GC-ECD, RT-PCR.

21986 | Seasonal Assessment of Microplastics (MPs) Contamination in Farmed Oysters (*Crassostrea gigas*) from the Lima River estuary

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Background & Aim: Plastic pollution is a major environmental concern due to its persistence, capacity to adsorb and release pollutants, and its impact on both wildlife and human health. Bivalve aquaculture is a growing economic activity taking place in estuaries and coastal areas, habitats which are highly susceptible to anthropogenic pressures, including MPs pollution. As filter feeders, bivalves are particularly susceptible to MPs accumulation in their tissues, potentially posing risks to seafood safety. This risk is influenced by both bivalve physiology and environmental conditions, which exhibit spatial and temporal variation. Thus, this study aim is to investigate seasonal MP contamination in farmed oysters within an estuarine production site.

Methods: Thirty commercial-sized oysters (average length \pm SD, 80 ± 7 mm) were collected from an oyster farm located in Lima estuary during late winter (Feb 2023) and early autumn (Oct 2023). MPs were extracted following a standardized protocol¹, characterized by shape, size, and colour under a stereomicroscope and polymers were further identified using Fourier transform infrared spectroscopy (ongoing work). **Results:** In winter, a total of 578 particles (PTS) were found, compared to 295 PTS in autumn, primarily comprising fibres in transparent, blue, black and grey colours. The average autumn concentration (\pm SD) was 2.2 ± 2.0 PTS g soft tissue⁻¹, representing 28 ± 17 PTS ind⁻¹, while in winter MPs average concentration was 0.3 ± 0.3 PTS g soft tissue⁻¹, representing 9.6 ± 7.9 PTS ind⁻¹, respectively. **Conclusions:** All the oysters analysed, except for one sampled in autumn, were contaminated with MPs. On average, winter contamination exceeded that of early autumn, possibly due to seasonal rainfall patterns and subsequent catchment leaching, consistent with other studies². Although polymer identification is still in progress, this study provides some baseline data on seasonal MP contamination patterns in oysters in an estuarine production area.

Keywords: Bivalves, Estuaries, Aquaculture.

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21996 | The impacts of viticulture practices on Portuguese soils

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Background & Aim: Given the high cultural and economic value of viticulture and wine production, it is crucial to implement management practices to minimize the associated negative environmental impacts, namely those related with soil health. It is well known that the quality of the wine is influenced by the complex interaction between the physical environments (edaphoclimatic factors) and its biota (microbiota, edaphic fauna) both contributing to the concept of terroir in viticulture. Considering that the soil is a source of microbial communities, the microbiome associated will drastically influence not only plant growth and grape production, but also the sensory characteristics of the wine. In addition, biodiversity can ensure viable and productive soils and reduce the negative impacts, as the incidence of pathogens. For this reason, this study intends to study the impact on soil properties and the sensitivity of different biological indicators to integrated production practices, as soil microbiome, soil meso and macrofauna functional and structural biodiversity, organic matter degradation and macrofauna feeding activity in the vineyards of Real Companhia Velha (Douro Region, Portugal). **Methods:** For the methodology, the sampling design of the vineyard plots under study were selected and co-created, based on three variables associated with management practices: grape variety sensitivity, vegetation cover and soil mobilization (using QGIS tools). The work that is now being carried out started with a screening sampling of vineyard plots already selected. **Results:** Then, proceeds to analyze the physical-chemical parameters of soil, such as pH, organic carbon, texture, nutrients, available phosphorus, water holding capacity (%WHC) and soil organic matter (SOM). **Conclusions:** Therefore, these preliminary results will be highly useful to characterize the soil type of the vineyard, which will enable significant progress to be made regarding sampling and the analysis of biological indicators.

Keywords: Vineyards, Management Practices, Soil Properties.

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22030 | Quantification and characterisation of marine litter collected through an innovative removal technology

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Background & Aim: Rivers act as conducting lines that connect the inland environments with the oceans. They have also become the primary pathway for marine litter (ML), with plastics accounting for over 80% of the total debris carried by these water flows. Despite this, continuous monitoring and solutions to minimize environmental impacts are scarce, while ML continues to increase at an alarming rate. Currently, some technologies are being implemented at a global level to reduce the litter that enters the oceans. One example is the Bubble Barrier (BB), an aquatic litter removal technology recently implemented in Vila do Conde, Portugal, as part of the European-funded project MAELSTROM. This study aims to classify and identify the main sources of both ML identified in the estuary and also collected by the BB while promoting scientific knowledge and spreading public awareness. **Methods:** Spatio-temporal distribution of ML was evaluated following standard European guidelines, before and after the implementation of the BB, at three different locations in the estuary: downstream, midstream and upstream. Furthermore, the litter collected by the BB was measured, identified, and categorised. **Results:** Significant differences were observed between locations and seasons. The highest concentration of ML (>70%) consisted predominantly of fragments of larger single-use objects, such as plastic pieces, cigarette butts and plastic bottles, caps, and food containers. Urban pressure is the primary source of ML in the estuary, based on the type of litter collected. **Conclusions:** Quantification and characterisation of ML, especially the one arriving from rivers, is essential for understanding the magnitude of the problem in which we are immersed. A change in the use consumption and disposal of plastics is urgently needed, to avoid further ecological damage.

Keywords: Marine Litter, Rivers, Estuaries, Bubble Barrier, Environmental Monitoring.

22049 | Groundwater Quality Assessment in the Area Adjacent to the Chemical Complex of Estarreja

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Background & Aim: The Chemical Complex of Estarreja is one of the most important industrial hubs at a national level, dedicated to the production of numerous raw materials such as vinyl chloride, MDI, caustic soda, among others. However, despite its economic success, past environmental mismanagement has brought detrimental effects to the environment of near areas where solid industrial waste is deposited, as well as in the surrounding areas of the channels used to transport liquid effluents to the Ria de Aveiro. Such actions have led to a decrease in the quality of groundwater in the area, which is used in agriculture. **Methods:** Considering this context, an assessment of groundwater quality was carried out at different depths to identify contamination hotspots. Samples were collected at 15 points, and some generic parameters (e.g., pH, conductivity, dissolved O₂) were determined, as well as levels of contaminants such as volatile organic compounds (VOCs), potentially toxic elements, anilines, nitrites, ammonia, and anions such as sulfates, nitrates, phosphates, bromides, fluorides, and chlorides. Subsequently, ecotoxicological assays were performed to assess the effects of contaminants on aquatic organisms, such as *Lemna minor*, *Raphidocelis subcapitata*, and *Allivibrio fischer*, following standardized protocols. **Results:** The results of the physicochemical characterization revealed contamination with potentially toxic elements such as As, VOCs such as trichloroethylene and isopropyltoluene, and inorganic contaminants such as nitrates. Ecotoxicological assays revealed adverse effects at some of the studied sites, with sensitivity dependent on the evaluated species. **Conclusions:** Concluding, these data suggest possible mismanagement of fertilizers used in agriculture, but also contamination of aquifers resulting from past ruptures in conduits used for effluent transport.

Keywords: Estarreja, Groundwater, Ecotoxicology, Contamination.

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22062 | Effect of a soil biofertilizer in the functional profile of the soil microbial community through the Biolog Assay

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Background & Aim: The dependency on crops of products with chemical compounds, whether fertilizers or pesticides, for saving the development and yield has been a challenge to the environment, and new alternatives are being sought to change this reality. The excessive use of chemicals affects human health and soil quality. There is a significant need to produce green compounds that are environmentally sustainable, improving or restoring microbial activity in the soil. Biofertilizers are compounds that contain biological substances and may be capable of stimulating plant development, by providing nutrients and other plant-growth promoting compounds and by increasing soil microbial activity, and reducing the impacts generated by mineral fertilizers. The objective was to verify the effects of applying a biofertilizer, Vitasoil™, which contains rhizospheric microorganisms that positively interact with plants, on the functional profile of the soil microbial community. **Methods:** The first evaluation was conducted one month after the application of the compound, using Biolog EcoPlates. **Results:** Its composition includes two types of bacteria: *Azotobacter* sp. and *Azospirillum* sp. We chose kale (*Brassica oleracea*) for the tests, with direct application of the compound diluted in the proper proportion to the plant's root, so that we could compare the inoculated soils with the non-inoculated ones. **Conclusions:** This method was able to show the effects of the inoculant application on the soil with and without *B. oleracea* plants and inferring about the positive/negative effects on the non-target bulk soil microbial community.

Keywords: Soil Health, Functional Biodiversity, Beneficial Microorganisms.

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22092 | Environmental safety of chitosan and clay nanobiopesticides incorporating essential oils

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Background & Aim: Agriculture is one of the major sources of diffuse pollution. Considering this, it's imperative to develop methodologies to decrease the toxicity of the phytopharmaceutical products and, additionally, to increase their effectiveness. The research on nanotechnology has shown potential in smart and sustainable agriculture. **Methods:** Combining nanomaterials with certain substances of interest, such as essential oils known for their biocidal activities, could be a way to more intelligently enforce biological control. However, it is required to do several ecotoxicological assays to evaluate the environmental risk of these new materials arising from nanotechnological developments. The chitosan nanoparticles presented a size of approximately 200nm, a good polydispersity index (PDI<0.2) and a positive charge. Regarding environmental safety, overall, chitosan nanoparticles are safer when compared to montmorillonite nanoconjugation. **Results:** The toxicity observed comes mainly from the essential oils. Moreover, the chitosan nanoparticles incorporating *Satureja montana* and *Thymus vulgaris* were the most toxic, possibly due to the phenols presence in their chemical composition. However, for the same reason, there was greater enzymatic activity from the soil microbiota in the presence of these two essential oils. The nanoparticles were successfully produced, protecting essential oils from the external environment while reducing their toxicity to non-target species. **Conclusions:** The hazards associated with nanobiopesticides are rare, and their evaluation through established testing protocols is rarely performed, therefore using the right guidelines, and enhancing our understanding on the ecotoxicological consequences of nanobiopesticides is imperative. Moreover, a different approach needs to start being applied:

where the impact on non-target organisms is first understood and then its effectiveness on the target species is studied for the safer doses.

Keywords: Agriculture, Environmental Safety, Nanobiopesticides, Non-Targeted Organisms.

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22127 | Application of Natural Deep Eutectic Solvents (NADES) for extraction and valorization of macroalgae beach wrack to produce targeted biostimulants and fertilizers

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Background & Aim: Lately, a plethora of promising extraction techniques for natural products have been emerging. One such are Natural Deep Eutectic Solvents (NADES), which are tailor-made solvents following green chemistry principles [1,2]. Macroalgal beach wrack inflicts negative biophysical and socio-economic impacts on tourist beaches, urging for a better management strategy than landfilling. Its nutrient and bioactive compounds-dense nature is promising for valorisation in agriculture [3,4]. **Methods:** A macroalgae sample was collected [Fig.1] and oven-dried at 60°C for 4 days. Various sugar-based NADES, previously used to extract phytohormones and bioactive compounds were chosen from the bibliography and prepared through heating and stirring at 60°C. NADES were tuned by adding water. Polarity and pH were determined through Nile red assay and using a pHmeter. An ultrasound-assisted extraction was optimized at 40°C for 45 min. Spectrophotometric assays were used to measure total phenolic content (TPC), phlorotannins (PhTs) and antioxidant activity on the extracts, through the Folin-Ciocalteu (FC), DMBA and DPPH methods. Phytotoxicity assays were conducted using *Solanum lycopersicum* sp. seeds. **Results:** Chosen NADES are binary combinations of choline chloride with glucose, fructose, sucrose, xylitol and lactic acid [Fig.2]. Polarity and pH values were obtained. An optimal biomass-to-solvent ratio was established for extractions. Extracts TPC, PhTs and free-radical scavenging capacity were determined. **Conclusions:** Abundant PhTs and TPC in Beach wrack extracts indicate good prospects for using NADES for biostimulant production. DMBA method was used to quantify PhTs, the most abundant phenolic compounds in brown algae. FC method was rejected because of interference with NADES' components, leading to precipitation and overestimation. NADES were found harmless at concentrations <1000 mg/L. Further assays are to be conducted to determine toxicity parameters on seed germination, e.g. LOEC, NOEC and EC₅₀.

Keywords: Natural Deep Eutectic Solvents, Macroalgae, Phlorotannins, Ultrasound-Assisted Extraction, Nile Red.

Acknowledgements

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Figure 1: Sorted macroalgae species from the sample collected at Praia da Memória during mid-September 2023 (considered as late summer/early autumn collection). A – *Saccorhiza polyschides*, B - *Codium* sp., C - *Chondrus crispus*, D - *Gigartina* sp., E - *Ulva* sp., and, E - Red algae mix

NADES	Molar ratio
Choline chloride : Glucose : Water	5:2:5
Choline chloride : Sucrose : Water	4:1:4
Choline chloride : D(-)-Fructose: Water	2:1:1
Choline chloride : Xylitol: Water	2:1:3
Lactic acid : Glucose : Water	5:1:3

Figure 2: List of Natural Deep Eutectic Solvents (NADES) chosen to perform extraction of beach wrack

22137 | Effects of the chronic exposure of cerium dioxide nanoparticles on polychaeta *Hediste diversicolor* using antidefense oxidative stress enzymes

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Background & Aim: Metallic nanoparticles are being used worldwide for several technologic applications. However, they are being recorded in several environmental matrices, including in the water compartment, raising serious concerns to the aquatic biota. **Methods:** *Hediste diversicolor* individuals were chronically exposed (28 days) to environmental realistic concentrations of cerium dioxide nanoparticles (5, 50 and 500 µg/L), including a negative control, in a laboratorial controlled experiment (3 replicates per experimental group, 5 individuals/replicate: an overall of 60 individuals). Their tissues were thereafter used in laboratory to quantify the activities of some antidefense oxidative stress enzymes, namely the catalase (CAT) and total glutathione peroxidase (GPx). All biochemical measurements were determined in triplicate through spectrophotometric readings following standard protocols. Data obtained was analysed using standard statistics (One-Way ANOVA, followed by a Dunnett test if needed). **Results:** CAT and GPx were calculated (U/mg protein), statistically analysed and interpreted taking into consideration the dosage-response relationship and their physiological function in the organism. **Discussion:** No statistically significant differences were found for both enzymes activities among the different experimental groups ($P > 0.05$). **Conclusions:** Biochemical biomarkers are useful tools to an early prediction of the severity of the environmental stressors on aquatic biota. In this particular case, no significant changes were observed for these two biomarkers. Future work should include other related biomarkers, such as, GSTs, SOD and TBARS.

Keywords: Environmental Stressors, Aquatic Compartment, Ecotoxicology, Biomarkers.

Acknowledgments

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21483 | The oldest herbarium: physical and digital curation of palaeobotanical specimens at the Natural History and Science Museum of the University of Porto (MHNC-UP)

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Background & Aim: The Natural History and Science Museum of the University of Porto (MHNCUP) houses invaluable palaeobotanical specimens, critical for advancing palaeontologic research and education. This study aimed to curate this collection, implementing physical preservation techniques and creating a digital repository for long-term conservation and accessibility. **Methods:** This work employs a comprehensive approach to curation, including digital inventory, assessment, and documentation of specimen condition and metadata. Preservation techniques ensure longevity. Digitization provides high-resolution images, which minimizes handling of the specimens. A database system is developed using Excel and *In Patrimonium*, with data standardized following recognized standards, such as Darwin Core. Metadata enrichment provides taxonomical and historical context. Data accessibility is prioritized through a user-friendly interface on *In Patrimonium*. Due to the reduced number of palaeobotanical specimens in the PO Herbarium, the inventory was extended to the MHNC-UP's plant paleontological collection. This allows standardizing the MHNCUP collections and makes the entire assemblage available for research and the public. This work will harbour visual representations of the museum's palaeobotanical specimens' geographical, stratigraphical, taxonomic, and historical information. **Results:** The curation successfully inventoried, preserved, and digitalized the herbarium specimens, preventing further deterioration of the materials and providing a more aesthetically pleasing collection. Metadata enrichment enhanced their significance, and the user-friendly interface in *In Patrimonium* ensures accessibility for everyone. **Conclusions:** Curation of the herbarium contributes to botanical heritage preservation and palaeobotanical research. This curated resource will serve palaeobotanists, researchers, educators, students, and the public, underscoring the importance of proactive curation in safeguarding botanical heritage.

Keywords: Herbarium curation, Palaeobotanical specimens, Digitization, Metadata enrichment, Data accessibility, Palaeontology.



GEOLOGY

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21527 | Paleozoological Wonders: Preserving the Fossil Heritage at the Natural History and Science Museum of the University of Porto (MHNC-UP)

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Background & Aim: The MHNC-UP, as custodian of priceless paleozoological specimens crucial for paleozoology research and education, undertakes this initiative to curate its paleozoological collection. This involves employing methods for physical preservation and establishing a digital repository to ensure the long-term conservation and accessibility of these significant specimens. **Methods:** The project aims to curate the museum's paleozoological specimens by conducting inventory, preservation, digitization, and database development. This involves comprehensive inventorying and documentation of specimen details, implementation of preservation techniques, digitization of fragile specimens, development of a database system for effective management, data standardization to ensure compatibility, metadata enrichment with contextual information, and ensuring data accessibility. **Results:** The curation effort successfully inventories, preserves and digitizes MHNC-UP's paleozoological specimens. Enhanced metadata adds to their significance, and the user-friendly interface on *In Patrimonium* platform will ensure accessibility for researchers, educators, and the public. **Conclusions:** The curation of MHNC-UP's paleozoological collection is a commendable effort in preserving paleozoological heritage and propelling research in the field forward. This curated resource serves as a valuable asset for various stakeholders, underscoring the importance of proactive curation in safeguarding paleozoological heritage.

Keywords: Paleozoological Specimens, Curation, Digitization, Metadata Enrichment, Data Accessibility.

21899 | Evaluating K-Means Classification for Manual Lineament Extraction: A Comparative Study with Band Ratio from Sentinel-1 imagery, in the Ria de Vigo, Spain

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Background & Aim: The Rias Baixas region, located on the Atlantic margin of southwestern Galicia, is composed of four funnel-shaped estuaries, of which the Ria de Vigo is the southernmost. The Galician Rias lie within the Galiza Trás-os-Montes Zone. The local geology is dominated by Variscan granites hosted in Palaeozoic metasediments, overlain by Quaternary-age sediments. The fracture system is NE-SW and NW-SE oriented [1]. This region is of special interest due to the occurrence of heavy-mineral placer deposits of Ti, Sn, Li, REEs, Au, Fe and Cu, classified as Critical Raw Materials by the European Union [2]. This work assesses K-Means Classification's feasibility to differentiate structural features, comparing it with a manually extracted lineament map to evaluate the results. **Methods:** A Sentinel-1 image was acquired. To pre-process, first an orbit file was applied, followed by Speckle Filtering and lastly Terrain Correction was conducted [3,4]. The K-Means image, using VH_Amplitude, VH_Intensity, VV_Amplitude and VV_Intensity bands (8 clusters, 15 iterations) was selected for lineament extraction. The VH and VV bands were obtained by a band ratio of VH_Amplitude/VH_Intensity and VV_Amplitude/VV_Intensity [3,4]. The band VH was chosen for manual lineament mapping, to serve as a comparison. Four Prewitt directional filters were applied to highlight lineaments in N-S, E-W, NE-SW and NW-SE directions [5]. An RGB composite of the three best directional filters was created. **Results:** For the VH band, 372 lineaments were extracted, compared to 172 for the K-Means image. Out of the 172 lineaments, only 24 don't align with the ones extracted from the VH band. This is mainly due to textural alterations. However, the medium orientation lineaments from both extractions are well aligned, being 139° N and 143° for the VH band and K-Means image, respectively. **Conclusion:** K-Means efficiently classified the most prominent lineaments with good accuracy, although in less detail and number when compared to the VH band.

Keywords: SAR, Sentinel-1, K-Means, Lineaments, Placers.

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21909 | Analysis of the Honeycombs of Lavadores Beach, Vila Nova de Gaia, Portugal

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Background & Aim: Lavadores Beach, at Vila Nova de Gaia, is a place of special geological and geomorphological interest due to the presence of peculiar geological and geomorphological elements, such as the geofoms known as honeycombs or *tafoni*. In this work, we located these geofoms and analyzed the cause of their occurrences on the rocky coast of the above-mentioned beach [1]. **Methods:** We located the honeycombs and measured the main ones from each location, using a measuring tape, a geological compass, a scale, and GPS, as reference for the photos. Afterwards, we used Google Earth Pro to pinpoint the exact locations of our object of study. Lastly, we got additional data from WeatherUnderground, Puertos del Estado, IPMA and LNEG's geoportal. **Results:** While analysing the data collected during field work, it was possible to observe the diversity in shape and dimension in the objects of study. We were able to notice certain characteristics of these geofoms, like the presence of sediments inside of them and the ease with which the feldspar phenocrystals broke away from the granite outcrop. Through bibliography and data analysis, it was possible to evaluate the mechanisms and environmental factors that led to the formation of these geofoms, allowing us to compare those found here with the ones found in other localities. **Conclusions:** This work allows us to conclude that the honeycombs suffered two phases of formation until they reached their current state. The first, tafonization, a chemical weathering process that takes the form of environmental factors such as humidity, precipitation, and salt crystallization. The second is physical weathering with factors like temperature, sea water, and wind. We also were able to find at least eight different honeycomb locations and establish a linear relation between depth and height of the structures [2].

Keywords: Geomorphology, *Tafoni*, Honeycombs, Vila Nova de Gaia, Lavadores.

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HEALTH SCIENCES

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21351 | Association between onychophagia and specific microbiota oral populations

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Background & Aim: Onychophagia is a common oral compulsive behavioral disorder observed in both children and young adults. It is a body-focused repetitive behavior more common (46,8%) in children, adolescents and among university students [1, 2]. This habit can alter the oral microbiome [3-5] and contribute to oral diseases [6]. Oral microbiome's diversity has aroused increasing interest in the healthcare area. To date, onychophagia is considered an unsolved problem in medicine and dentistry. Therefore, this study aimed to investigate the effect of onychophagia on the oral microbiota among dentistry students. **Methods:** Saliva samples were collected from 52 dentistry students: 24 non-nail biters and 28 nail biters (NB), and pH was measured with pH paper (Duotest® pH 5-8). Microorganism species were determined by culture on three selective mediums: MacConkey agar, Sabouraud Agar, and Mannitol Salt Agar. Additionally, an anonymous questionnaire assessed oral hygiene and nail-biting habits. Comparative analysis was conducted on pH, oral hygiene, and microbiota prevalence. **Results:** Subjects presented a salivary pH of 6.71 ± 0.27 , a flow rate of 0.38 ± 0.22 mL/min and an oral colonization of *Staphylococcus aureus* (78.4%), lactose-fermenting bacteria (51%), and fungi (33.3%). Oral hygiene habits did not differ between non-NB and NB regarding tooth brushing frequency and time ($p=0.787$). Among the nail-biters (53.8%), 50% bit only their fingers, and 42.9% bit both fingers and nails. Oral colonization did not differ between non-NB and NB regarding *Staphylococcus aureus* (47%vs53%, $p=0.904$); Lactose-fermenting bacteria (45%vs.55%, $p=0.683$), and fungi (47%vs53%, $p=0.234$). **Conclusions:** Onychophagia doesn't appear to influence oral *Staphylococcus aureus*, lactose-fermenting bacteria, and fungi, however further studies need to be conducted to better understand the impact of NB habits on overall oral microbiota.

Keywords: Onychophagia, Oral Microbiome, Dentistry Students, Hygiene Habits.

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21386 | Caffeine-composed dermopharmaceutics and cosmetics: a state of the art analysis based on bibliometric maps towards product valorization

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Background & Aim: Caffeine (1,3,7-trimethylxanthine) is commonly consumed in beverages such as coffee and tea, ranking as the second most widely consumed beverages globally, following water [1]. It is an alkaloid of interest for the pharmaceutical industry because of its stimulating properties on the nervous and cardiovascular systems [2]. It acts as a psychoactive stimulant, sustaining concentration and heightening awareness while suppressing fatigue. Caffeine can play dual roles, maintaining elevated attention levels on one hand and potentially leading to dependence with excessive use on the other [3]. Caffeine-based cosmetic products have also gained increasingly interest in recent years. The use of caffeine as active ingredient in cosmetic products is attributed to its active role in hair growth, its anti-cellulite effects, antioxidant properties, and its capacity to counteract photoaging in daily creams and beauty masks. When applied topically, caffeine reduces dark circles effectively through its vasoconstrictive action and attenuates wrinkles [4]. To ensure that caffeine can go deeper into the skin without reaching systemic circulation, nanoparticles have been proposed as delivery systems for topical administration. The influence of particle size directly affects the depth to which loaded actives can penetrate the skin [5]. In this study, we conducted a bibliometric analysis of most recently published works indexed to Scopus and Web of Sciences databases and discussed the state of the art about the latest developments on the valorization of caffeine in dermopharmaceutic and cosmetic products. We found that several approaches for its recovery from different sources are possible besides its development through the innovative nanoparticles made of different types of polymers. Recent research shows that the combination of both caffeine and nanoparticles holds enormous potential for applications in both cosmetic and dermopharmaceutical fields.

Keywords: Caffeine, Circular Economy, Nanoparticles, Cosmetics, Dermopharmaceutics.

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21388 | Nuclear morphometric features triggered by E-cadherin dysfunction

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Background & Aim: E-cadherin is a pivotal molecule for cell-cell adhesion and maintenance of polarized and differentiated epithelia [1]. Genetic and epigenetic alterations of E-cadherin gene (CDH1) occur in 60% of gastric carcinomas, resulting in increased cell invasion and metastasis [2]. However, the mechanisms underlying disease etiology are far from understood, perpetuating its poor prognosis. We hypothesize that loss of E-cadherin causes an imbalance in mechanical loads throughout the actin cytoskeleton, inducing nucleus remodeling and a consequent invasive signature. Our main aim is thus to decipher architectural and molecular nuclear features underlying invasive cancer. **Methods:** Herein, we have established an *in vitro* model of a cancer cell line expressing a novel E-cadherin missense variant identified in diffuse gastric cancer patients. Specifically, we transfected a cadherin-negative cell line with vectors encoding the Y755C E-cadherin mutant or the wild-type protein, as a control. Nuclear morphological features of the different conditions were then evaluated through transmission electron microscopy (TEM) coupled with advanced bioimaging techniques. **Results:** We verified that Y755C E-cadherin mutant cells display an abnormal nuclear morphology, when compared with those expressing the wild-type protein. In particular, quantitative analysis of TEM images revealed that the nuclei of E-cadherin mutant cells have significantly higher area and perimeter than those from the wild-type counterparts. Moreover, the Y755C mutant presents less intense and irregular nuclei, in contrast with more compact and circular shapes exhibited by wild-type cells. **Conclusion:** This work provides evidence that E-cadherin dysfunction alters nuclear physical properties, possibly impacting the invasive capacity of gastric cancer cells. We envision that these nuclear readouts may be explored for the generation of Artificial Intelligence-based frameworks to identify patients at risk of cancer progression.

Keywords: E-Cadherin, Cell-Cell Adhesion, Nucleus, Cancer Invasion.

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21397 | Level of 4-methylimidazole, a carcinogenic compound, in beverages

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Background & Aim: Food presentation is an important factor for market acceptance. So, to make it more attractive, color additives are widely used. Among the oldest food color additives are caramel colors, which are used nowadays by food industry in a wide range of foods and beverages due to their color, flavor, and other properties, such as stabilizing colloidal systems and preventing haze formation in beers. 4-methylimidazole (4-Mel) is one of the degradation products of caramel IV color (E150d) which has been proven to be a neurotoxic and carcinogenic agent. European legislation establishes maximum limits for the presence of 4-Mel in caramels, although it does not establish limits for its presence in food. The main objective of this study was to quantify the 4-Mel content in 36 samples of carbonated drinks (energy drinks, soft drinks, dark beers), acquired in several countries, containing caramel IV in their composition in order to compare the levels of 4-Mel found with the situation observed in the market in 2010.^[1]

Methods: The 36 samples were prepared according to the scheme of figure 1. To determine the presence of 4-Mel in caramel, a gas chromatography-mass spectrometry (GC-MS) method based on ion pair-extraction with bis-2-ethylhexylphosphate (BEHPA) and isobutylchloroformate derivatization have been successfully applied. **Results:** Overall, soft drinks showed higher amounts of 4-Mel (ranging from 431 to 1381 µg/L) than those found in the dark beers (ranging from 90 to 437 µg/L), with colas presenting the highest levels. 4-Mel was also found in two of the three energy drinks studied. **Conclusions:** In general, the levels found in 2023 are higher than those reported in 2010, with soft drinks from India presenting the highest levels.

Keywords: 4-Mel, Beverage, Beers.

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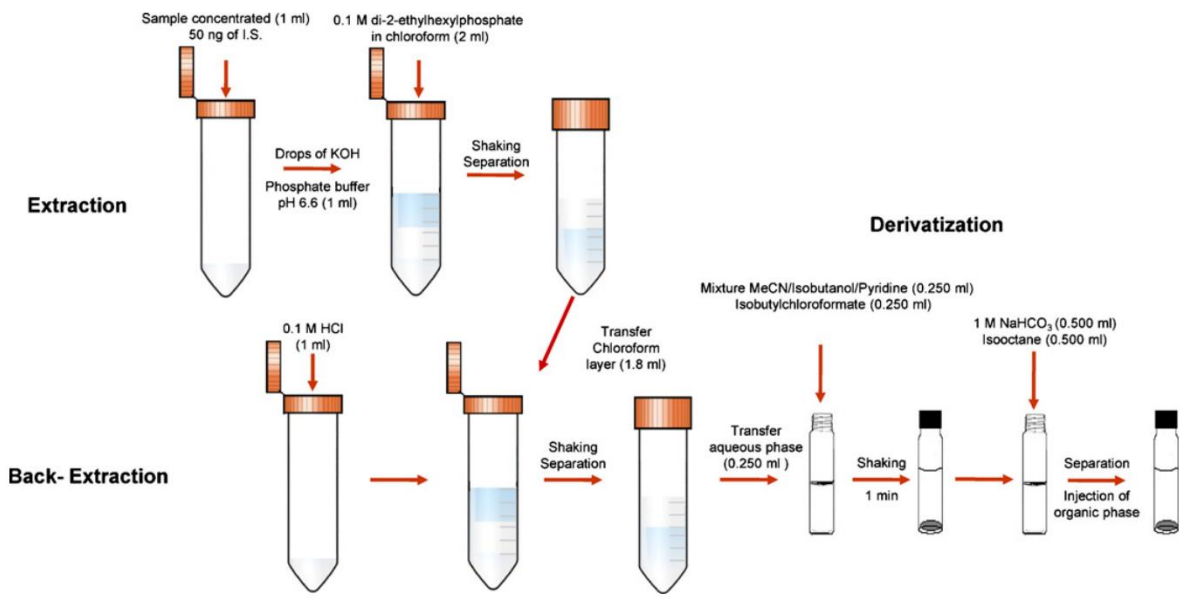


Figure 1: Sample preparation scheme used in this study. [1]

21398 | hCG and GnRH agonist – oocyte maturation trigger's impact on infertility treatment outcomes in high-responders: a report on 705 cycles

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Background & Aim: Infertile individuals treated with in-vitro fertilization [1] or intracytoplasmic sperm injection [2,3] need a controlled ovarian hyperstimulation protocol [4]. The main complication is ovarian hyperstimulation syndrome (OHSS), associated with human chorionic gonadotropin (hCG) as the oocyte maturation trigger [5]. The alternative use of a gonadotropin-releasing hormone agonist (GnRHa) as trigger, decreases OHSS risk [6,7] but compromises implantation, needing special endometrium preparation [8]. Alternatively, embryos could be frozen, and embryo transfer postponed, thus abolishing OHSS cases [9,10]. However, the freeze-all approach is still not routine. The present study aimed to evaluate how GnRHa and hCG, as triggers, affect clinical outcomes and OHSS rates in a high-responding population, in which no large studies have been performed to date. **Methods:** Infertile women, less than 38 years old, were selected as high-responders if at least one of the following criteria was present: estradiol levels ≥ 3000 pg/ml, last ultrasound with ≥ 20 follicles, or ≥ 13 cumulus-oocyte complexes. We analyzed 705 treatment cycles in 652 high-responder patients, and compared 473 cycles using GnRHa as a trigger with 232 cycles using hCG as a trigger. Statistical analysis was performed with the IBM SPSS Statistics 29.0 program, with $p < 0.05$ as significance. **Results:** No significant differences were found concerning OHSS development (hCG 3.9% vs 3.4% GnRHa), and OHSS hospitalization rates (hCG 1.3% vs 0.6% GnRH). The GnRHa group presented significantly higher blastocyst ($p=0.003$), clinical pregnancy ($p=0.042$), and implantation ($p=0.020$) rates. There were

no significant differences regarding clinical abortion, ectopic pregnancy, ongoing pregnancy, live birth delivery, and newborn rates. **Conclusions:** Results suggest that, in high-responders, the GnRHa trigger, although not abolishing OHSS, is a better option than hCG as it improves the blastocyst, implantation, and clinical pregnancy rates.

Keywords: Assisted Reproductive Treatments, Gonadotropin-Releasing Hormone Agonist, High Responders, Human Chorionic Gonadotropin, Ovarian Hyperstimulation Syndrome.

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Table 1: Clinical outcomes

Table 4 Clinical outcomes				
	hCG	GnRH Agonist	Total	p
Parameters				
Patients (n, rate)	221	431	652	
Cycles (n, rate)	232	473	705	
Embryo transfer cycles (ETC) (n)	208	327	535	
Stimulation outcomes				
OHSS (n, rate)	9/232 (3.9)	16/473 (3.4)	25/705 (3.5)	0.738
OHSS with hospitalization (/cycle) (n, rate)	3/232 (1.3)	3/473 (0.6)	6/705 (0.9)	0.371
OHSS without hospitalization (/cycle) (n, rate)	6/232 (2.6)	13/473 (2.7)	19/705 (2.7)	0.935
OHSS with hospitalization (/OHSS) (n, rate)	3/9 (33.3)	3/16 (18.8)	6/25 (24.0)	0.412
OHSS without hospitalization (/OHSS) (n, rate)	6/9 (66.7)	13/16 (81.2)	19/25 (76.0)	0.412
Freeze-all cycles (n, rate)	14/232 (6.0)	130/473 (27.5)	144/705 (20.4)	<0.001
Pregnancy outcomes				
Biochemical pregnancy (/ETC) (n, rate)	11/208 (5.3)	16/327 (4.9)	27/535 (5.0)	0.839
Clinical pregnancy (CP/ETC) (n, rate)	108/208 (51.9)	199/327 (60.9)	307/535 (57.4)	0.042
Sacs (n)	136	214	350	
Implantation rate (n° sacs/n° ET) (rate, %)	41.7	50.2	45.5	0.020
Singletons (/CP) (n, rate)	76/108 (70.4)	175/199 (87.9)	251/307 (81.8)	<0.001
Twins (/CP) (n, rate)	31/108 (28.7)	21/199 (10.6)	52/307 (16.9)	<0.001
Ectopic pregnancy (/CP) (n, rate)	1/108 (0.9)	3/199 (1.5)	4/307 (1.3)	1.000
Abortion (/CP) (n, rate)	17/108 (15.7)	35/199 (17.6)	52/307 (16.9)	0.680
OP (/ETC) (CP-Ab-Ect) (n, rate)	90/208 (43.3)	161/327 (49.2)	251/535 (46.9)	0.178
Eutocic delivery (/Delivery) (n, rate)	32/90 (35.6)	76/160 (47.5)	108/250 (43.2)	0.067
Distocic delivery (/Delivery) (n, rate)	58/90 (64.4)	84/160 (52.5)	142/250 (56.8)	0.067
Delivery (/ETC) (Eutoc + Distoc) (n, rate)	90/208 (43.3)	160/327 (48.9)	250/535 (46.7)	0.201
Stillbirth (n, rate)	1/90 (1.1)	0	1/250 (0.4)	
LBDR (/ETC) (Delivery-Stillbirth) (n, rate)	89/208 (42.8)	160/327 (48.9)	249/535 (46.5)	0.165

Table caption: GnRH: gonadotropin-releasing hormone; HCG/rHCG: human chorionic gonadotropin/recombinant human chorionic gonadotropin; OHSS: ovarian hyperstimulation syndrome; OP: ongoing pregnancy; LBDR: live birth delivery rate. A value of $p < 0.05$ was considered statistically significant.

21400 | Botanical supplements with reported efficacy in improving mental performance

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Background & Aim: The primary objective of the study is to identify and evaluate botanical supplements that have reported efficacy in improving mental performance and supporting the maintenance of brain function homeostasis. **Methods:** Conduct a literature review to identify relevant clinical trial assessing the improving effects of plant extracts on cognitive function. Utilize databases such as PubMed, *PubMed Central*, Scopus, Google Scholar, CNKI to retrieve clinical trial. This research only takes in consideration of either whole plant-medicines or isolated constituents (herbal extract combination or traditional Chinese medicine formulations were considered as complex and specialized areas beyond the remit of this study). Extract data from selected studies, including information about study design, study population (healthy individuals/patients with dementia), sample size, recommended daily intake, duration, and outcomes related to cognitive function. Perform an analysis to combine the findings from multiple studies and assess the overall effect of botanical supplements on cognitive enhancement. **Results:** Identification of evidenced botanical supplements which are reported by randomized clinical trials, such as trans-resveratrol [1], Curcumin [2], Rhodiola rosea extract [3], Huperzine A [4], Ginkgo biloba extract [5], based on the findings of the review. Discussion on the conditions of use required to achieve the reported health effect such as formulation, source/provider, composition of the plant extract, and recommended daily intake. Explore how variations in these conditions may impact the reproducibility of the observed effects in clinical practice. **Conclusions:** Overall, this research proposal aims to contribute to the evidence-based practice by providing the selection and recommendation of botanical supplements for cognitive. Discuss considerations for achieving outcome and safety in consumer.

Keywords: Botanical Supplements, Cognition, Dementia, Herbs.

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21410 | Evaluation of the activation profile of antigen presenting cells by an extract of *Toxoplasma gondii* by in vitro models

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Toxoplasma gondii is a highly successful parasite which infects over 30% of the global population [1]. This infection can lead to toxoplasmosis, which have clinical importance in pregnant women and immunocompromised individuals [2,3]. As such, the development of a human vaccine to prevent toxoplasmosis is necessary [4]. Our previous work shows that intranasal immunization using a *T. gondii* membrane protein (TGMP) extract conferred protection against acute murine infection. Dendritic cells (DCs) are crucial to cellular immune response as antigen presenting cells, activating CD8 and CD4 T cells and cytokine production such as interleukin 12 [5]. Our study aims to determine if the TGMP extract induce DC activation, to be delivered in a vaccine formulation. To do so, *T. gondii* tachyzoites were obtained by *in vitro* culture. Then, parasites were isolated through a PD-10 desalting column and TGMP was extracted as described [6]. The protein profile was analyzed using SDS-PAGE electrophoresis and silver nitrate staining. Afterwards, immunogenic proteins were determined by Western Blot (WB) using sera from TGMP immunized mice. DCs were differentiated from bone marrow cells from BALB/c mice with granulocyte-macrophage colony-stimulating factor [7]. Cytotoxicity was then determined by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay and activation markers were determined by flow cytometry. For quantification of DC activation markers, it was performed a kinetic study with bacterial lipopolysaccharide as a positive control. Our results by SDS-PAGE show protein profiles with intense bands with weights of 32.4 Kilodalton (KDa), 27.5 KDa and 17.1KDa correlated with the weights of the immunogenic bands detected by WB. Results show an increase of major histocompatibility complex II (MHCII) expression by DCs at 4 and 6-hour and a decrease at 16-hour after TGMP exposure. Our work with DCs will be a substantial step towards the development of a vaccine preventing toxoplasmosis.

Keywords: Toxoplasma Gondii, Dendritic Cells, Flow Cytometry

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21437 | Development of an Orthotopic Xenograft Model to Determine the Impact of FLVCR1 in Tumour Growth, Metastasis and Resistance to Chemotherapy *in vivo*

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Background & Aim: Primary liver cancer is the sixth most common neoplasm worldwide and the third cause of cancer-related deaths[1]. Hepatocellular carcinoma (HCC) is the most common subtype of liver cancer, comprising 75-85% of all cases, so it is vital that new effective therapies are developed to improve its patients' quality of life and expected lifespan[1,2]. The liver represents the major storage site for iron, an element that has a dual role in cancer progression. Iron is essential for growth and proliferation of tumour cells, but excessive iron can generate reactive oxygen species, which damage cells and promote cell death by ferroptosis[3]. Around 95% of functional iron is in the form of heme, which requires that its intracellular concentration be tightly controlled[4]. Feline leukemia virus subgroup C receptor-related protein 1 (FLVCR1) is a heme exporter that has been shown to be overexpressed in HCC, as well as associated to a worse prognosis[5], although its role in this disease remains unexplored. We have evidence that liver-specific FLVCR1 KO decreases the incidence of HCC in mice treated with diethylnitrosamine and CCL₄. In parallel, we generated FLVCR1 KO in human HCC cells (Huh-7) by CRISPR/Cas9. The loss of FLVCR1 function decreased cell migration *in vitro* and the ability to invade the chorioallantoic membrane model. We hypothesized that FLVCR1 plays a pro-tumourigenic role in HCC. Our aim is to evaluate the impact of FLVCR1 in tumour growth, response to chemotherapy and metastasis in an HCC orthotopic xenograft model. **Methods & Results:** For this, we are establishing luciferase-expressing FLVCR1 WT and KO human hepatoma cell lines, by resorting to lentivirus as the plasmid delivery method. The cells will then be injected intrahepatically under ultrasound guidance in severe immune-deficient mice (NSG). Finally, tumour growth, chemotherapy response and metastasis will be evaluated through bioluminescence imaging. **Conclusion:** We expect to disclose FLVCR1 as a key player in the pathophysiology of HCC.

Keywords: Hepatocellular Carcinoma, Feline Leukemia Virus Subgroup C receptor-related protein 1, Heme, Orthotopic Xenograft Model.

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21451 | 3D immunospheroids: A new model to understand the impact of macrophages in Triple-negative breast cancer

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Triple-negative breast cancer (TNBC) is the most invasive and radioresistant subtype of breast cancer [1, 2]. TNBC is highly infiltrated with macrophages, which is associated with therapy resistance and worse prognosis [3]. The modulation of these populations can potentiate the immunogenic cell death induced by radiotherapy [4, 5]. Our study aims to develop *in vitro* 3D models that mimic the tumour microenvironment to unveil the mechanisms of resistance. For this, we developed tumour-spheroids (TS) and tumour immunospheroids (TIS) with MDA-MB-231, Hs578T, and BT-20 TNBC cells. For TIS development, monocytes, isolated from healthy blood donors, were seeded with cancer cells and were differentiated into macrophages. After 8 days, viability and metabolic activity were assessed by flow cytometry and Cell Titer Glo assay, respectively. Morphology was evaluated by hematoxylin/eosin staining, and spheroids' compactness, diameter, and circularity were analyzed using the AnaSP software. To optimize the models, we analyzed cell behavior, in at least three media with distinct glucose levels, using different seeding densities. For Hs578t and MDA-MB-231 TS, the initial density of 5000 cells/spheroid in DMEM/F12, and for BT-20 TS, the initial density of 2000 cells/spheroid in RPMI was selected as ideal to sustain cancer cells' viability. Hs578T spheroids were the most compact, with the smallest diameter. BT-20 TS exhibited the highest metabolic activity and proliferation rates. Currently, the optimization of TIS is ongoing. Preliminary results suggest that BT20 proliferation rate impacts the infiltration and viability of human macrophages, while in MDA-MB-231 TIS, macrophages seem to support cancer cell viability after irradiation. Lastly, we envisage to expose these 3D models to radiotherapy and evaluate the molecular alterations induced by the presence of macrophages. This will improve our understanding of the role of macrophages in the breast cancer microenvironment and uncover novel therapeutic targets.

Keywords: Triple-negative Breast Cancer, Radioresistance, Macrophages, Tumour Microenvironment.

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21458 | Paracetamol impacts bone development in the chicken embryo development model

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Background & Aim: Paracetamol is frequently used worldwide as an analgesic agent. Its efficacy associated with minimal side effects has rendered paracetamol one of the most appealing therapeutic choices for pain management in potential sensitive groups, including pregnant women. However, recent studies have suggested that paracetamol, due to its ability to cross the placental barrier, can hinder fetal development *in utero*. Paracetamol's inhibition of cyclooxygenase (COX), predominantly on COX2, by its metabolite AM404 might hinder osteoblastic differentiation and potentially disturb bone metabolism. To date, very few studies have focused on the effect of skeletal development during embryonic development. Therefore, the present study aims to evaluate the effect of paracetamol on skeletal development within the chicken embryonic development model. **Methods:** Fertilized chicken eggs were injected with varying dosages of paracetamol, ranging from 10mg/Kg to 500mg/Kg, with the control group injected with a phosphate-buffered saline. Following, and upon embryonic development, whole-mount histochemical staining with Alcian blue/Alizarin Red S were conducted and histomorphometric analysis was performed to address the skeletal system. This approach enables the skeletal characterization, differentiating between mineralized tissue (red) and cartilaginous matrix (blue). **Results:** Preliminary results suggest that the impact of paracetamol on skeletal development is dose-dependent. Overall, higher doses of paracetamol were associated with a reduction in total bone length and the extent of the mineralized bone structure. **Conclusions:** Paracetamol may negatively impact skeletal bone development on the growing chicken fetus, in a dose-dependent manner, underscoring the relevance of further studies regarding its use during pregnancy.

Keywords: Paracetamol, Chicken Embryo, Bone development, pregnancy.

21459 | Online Course on Digital Health Technologies for Pharmacy Graduates: Development and Evaluation.

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Background & Aim: The integration of digital technology in pharmacist practice progresses with time (1). Efforts to incorporate a digital curriculum are evident, emphasizing the need to align professionals' skills with rising demands in digital health (2). Despite intense promotion, many pharmacy schools lack this training, highlighting the importance of defining clear goals for valuable educational results (1,3). This study aims to develop a syllabus allowing students to acquire digital health competencies through an online course and assess knowledge gain and perception change. **Methods:** Employing an experimental design based on literature and pharmacist survey, this study adopts a mixed-methods approach with around 200 participants. A quasi-experimental pre-post-test model, along with pre-validated, semi-structured online survey, will evaluate changes. SPSS will be used for quantitative data analysis, and Nvivo will be used for qualitative data analysis. **Results:** Expected impacts include enhanced knowledge and perception change, reflecting syllabus effectiveness. Survey responses could demonstrate coverage efficacy. **Conclusions:** This study can advance digital education for pharmacy professionals, transforming healthcare technology and care quality.

Keywords: Digital Health Technologies; Pharmacy Education; Distance Learning.

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21491 | The role of hypoxia in the *KRT17* and *TPSAB1/B2*-mediated modulation of the colon cancer microenvironment

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In colon cancer, the effect of hypoxia on the non-malignant component of the tumour microenvironment (TME), namely the cancer-associated immune cells, is not yet completely understood. It is known that macrophages accumulate within hypoxic regions, which is relevant since these cells are profusely represented at the TME and can present anti- or pro-tumour phenotypes. In colon cancer, macrophages function is still controversial. We aim to clarify the role of hypoxia, dissecting how it modulates the crosstalk between colon cancer and immune cells. For this, cocultures of macrophages, colon cancer and T cells were established. Nanostring was used to explore molecular differences between normoxia and hypoxia and The Cancer Genome Atlas (TCGA) to validate achieved results in patients' samples. Nanostring analysis revealed substantial gene expression alterations under hypoxia (92 genes up and 34 downregulated). From the most significantly altered genes between normoxia and hypoxia, *KRT17* and *TPSAB1/B2*, previously shown to be associated with a hypoxic cluster, were validated in a cohort of colon cancer patients. Alterations at the RNA level were also confirmed at the protein level, and the relevance of macrophages and T cells to the hypoxia-induced alterations was addressed. Our findings were validated at the clinical level through the association of *KRT17* and *TPSAB1/B2* expression with colon cancer patients' clinicopathological information (TCGA). Obtained results revealed higher expression of *KRT17* in tumour tissues, particularly in hypoxic high tumours, in contrast to normal tissues. Moreover, *KRT17* expression was higher in patients with mutant *KRAS* and mutant *PIK3CA*. The *TPSAB1/B2* expression was lower in tumours, compared with normal tissues, but was higher in hypoxic high compared with hypoxic low tumours. Since low oxygen levels significantly alter the gene expression program at the colon cancer microenvironment, our results suggest that hypoxia is a critical feature when studying TME interactions.

Keywords: Hypoxia; Colon Cancer; Tumour Microenvironment.

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21517 | Food Supplements with Probiotics in the evolution of Gastrointestinal dysfunctions

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Background & Aim: Gastrointestinal dysfunctions represent a significant public health problem, with a growing prevalence worldwide at approximately 68% from 1990 to 2019 [1]. Major investment is required in research and development of innovative strategies to overcome the situation. In this work the use of food supplements with probiotics as an innovative strategy for gastrointestinal disorders (irritable bowel syndrome, IBS; celiac disease and *Helicobacter pylori* infection) were explored. Probiotics are living microorganisms that, when consumed in adequate quantities, provide benefits to the host [2]. They are associated with the control of dysbiosis, the origin of several diseases, and, consequently, with the improvement of gastrointestinal health [3]. Therefore, the objective of this work is to analyze the literature produced in order to evaluate the potential benefits of probiotics in the evolution of gastrointestinal disorders to understand how this innovative strategy may be associated with the reduction in the prevalence of these problems worldwide. Moreover, we sought to understand probiotic strains, dosage, and duration of intervention, based on the principles and effects caused by probiotics. Thus, it is intended to provide valuable information for future research and applications of probiotics to support and improve the symptoms of such disorders.

Methods: The methodology of this work involves a comprehensive review of existing literature and meta-analysis of data based on specific gastrointestinal diseases. We performed a literature search on gastrointestinal diseases on PubMed covering the years 2000 to 2024. An initial review of PubMed using the terms "Gastrointestinal Disorders", "Probiotics", "Celiac Disease", "*H. pylori* Infection", "Inflammatory Bowel Disease" and "Food Supplements" revealed several different interesting and promising key areas of research, which were subsequently analyzed and explored. These broader terms were then combined with vocabulary that would direct the search towards our goal. For this purpose, there was an association with the prompts "treatment", "therapy" and "intervention"; "etiology", "risk factors" and "pathogenesis" and "diagnosis", "differential diagnosis", "diagnostic methods". In order to select the studies that most adequately suited our research we implemented two criteria: studies on human beings and meta-analyses, reviews and randomized controlled trials. The articles that were subjected to interpretation were individually scrutinized and included a representative sample of the study

population and used standardized and recognized assessment methods. Our research focused on direct applicability in patient care and the selected studies exhibited direct and relevant correlations to clinical practice, providing information that could potentially impact decisions on diagnosis, treatment, or management of patients with gastrointestinal diseases. **Results:** The results show that supplementation with probiotics can be used as an adjuvant in the treatment of IBD, celiac disease and *H. pylori* infection, namely the reduction of abdominal pain and other symptoms in the first case [4] and reduction in the stool frequency in the second case [5]. This research also reinforces the need for a personalized approach that considers different bacterial strains and their interactions with each individual's unique conditions. Dietary supplements combined with standard therapy, as demonstrated in the treatment of *H. pylori* infection, is also emphasized as a solution of interest [6]. **Conclusions:** This work aims to summarize current evidence on the use of dietary supplements with probiotics in gastrointestinal diseases, namely IBL, celiac disease, and *H. pylori* infection. These products have promising potential, although, new studies are needed to standardize and clarify this approach in the context of gastrointestinal diseases.

Keywords: Probiotics, Dietary Supplements, Gastrointestinal Diseases, Celiac Disease, *H. pylori* Infection and Inflammatory Bowel Disease.

Acknowledgments

Professor Maria Beatriz Oliveira for her support and supervision

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21520 | Development of new oleogels with natural organogellators for cosmetic applications

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Background & Aim: Oleogels hold significant potential in cosmetics due to their low-cost, capacity to promote the chemical stability of active ingredients, improved rheological properties, and enhanced delivery profiles [1]. Since they present a high content of lipids, they have emollient properties, promote barrier repair, and reduce the transepidermal water loss (TEWL) of the skin [1,2]. The versatility of oleogels combined with natural organogellators presents an opportunity for innovation in the cosmetic field [2-4]. This study aims to explore the development of new nature-inspired oleogels. **Methods:** The preparation of oleogels will follow direct and indirect methods [5]. The natural organogellators, cholesterol, carnauba wax, and sodium alginate, will be tested with oils typically used in cosmetic formulations. The oleogels will be characterized regarding minimal gelling concentration, organoleptic characteristics such as color and homogeneity, microscopic structure, and physical stability. **Results:** Preliminary results indicate successful gelation of virgin olive oil with cholesterol and carnauba wax, with a direct method, at concentrations superior to 5% and 4%, respectively. Efforts to obtain oleogels with other oils and with different techniques will be made to expand the diversity of gel structures and properties. **Conclusions:** In conclusion, this study provided insight in the field of oleogels, by exploring the repertoire of natural ingredients able to act as organogellators, paving the way for innovative green cosmetics.

Keywords: oleogels; natural organogellators; cosmetics

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21529 | Unveiling the mechanisms of CCL18-mediated colorectal cancer cell invasion

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Colorectal cancer (CRC) constitutes 10% of the worldwide cancer burden.¹ Despite advances in screening, nearly 25% of patients are diagnosed at advanced stages, limiting therapeutic options and leading to poor prognosis and high mortality rates.² Understanding the tumour microenvironment is imperative for comprehending CRC development.⁴ Macrophages influence cancer cells promoting tumour progression through the production of signaling mediators.⁴ Our research has spotlighted CC chemokine ligand 18 (CCL18), an immunosuppressive and pro-tumoural chemokine produced by M2-like macrophages, as a player inducing cancer cell invasion.⁵ However, the inherent mechanism of action is still poorly understood in CRC, emphasizing the need to delve into these processes. To dissect the impact of CCL18 on *in vitro* CRC migration, proliferation, and proteolytic activity, we are performing wound-healing and single-cell migration assays, ki-67 expression and cell cycle analysis, and gelatin zymography, respectively. To disclose the impact on tumour growth and stimulation of angiogenesis *in vivo* we used the chorioallantoic membrane (CAM) model. To unveil CCL18 receptors and associated signaling pathways, we are employing CRISPR-Cas9 technology. A pilot study with CAM assay indicated Matrigel dependency for tumour formation, with RKO cell line allowing angiogenic readout, while HCT-15 formed high-volume tumours even without treatment. Four independent experiments exhibited no significant differences in both parameters in the presence of CCL18 (20ng/mL), suggesting that this chemokine does not impact cancer cell-induced angiogenesis. Preliminary results suggested CCL18 as a potential inducer of CRC migration. This ongoing investigation combines *in vitro* and *in vivo* analyses to clarify the mechanisms underlying CCL18 impact on CRC progression and to identify the involved receptors for future therapeutic modulation.

Keywords: Colorectal Cancer; CCL18; Tumour Microenvironment; Macrophages; Invasion

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21456 | Validation of a genetic system to unravel the astrocyte specific secretome through proximity biotinylation

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Background & Aim: Aberrant synapse formation and maturation is linked to a range of central nervous system (CNS) disorders.¹ Astrocytes have been shown to regulate synaptic formation and function, by cell surface adhesion molecules and secreted proteins. However, most of these factors are yet to be identified, especially the ones involved in inhibitory synapse assembly and maturation.² To date, the identification of secreted factors has been laborious and time consuming, involving complicated chromatographic methodologies. In this project we aim to overcome this by selectively biotinylating astrocytic proteins in the secretory pathway, allowing their direct isolation from culture media for further identification.³ More specifically, we aim to transduce primary astrocyte cultures with lentiviral vectors expressing TurboID, a promiscuous biotin ligase,⁴ fused with two different sequences that direct it to the lumen of the endoplasmic reticulum (ER).⁵ Conditioned media from the transduced astrocytes can be collected, biotinylated proteins pulled down using streptavidin magnetic beads, and identified by mass spectrometry, providing us with the astrocyte secretome. This list can then be analysed for proteins possibly involved in CNS disease, and tested for synaptogenic function in the host lab.

Methods: I have tested two constructs expressing TurboID linked to the ER retention sequences in commonly used cell lines, both by immunofluorescence and Western Blot analysis. **Results:** In transfected cells, by immunofluorescence I observed colocalization of both constructs with the ER resident protein calnexin. Additionally, I confirmed the presence of biotinylated proteins inside transfected cells – by immunofluorescence and Western Blot analysis – and in their conditioned media – by Western Blot analysis. **Conclusions:** With this work I validated the system we will use on the near future to identify the proteins secreted by primary astrocytes.

Keywords: Astrocytes, Secretome, Proximity Biotinylation

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21539 | “NESTE CARRO NÃO SE FUMA”: Evaluation and adaptation of a project promoting smoke-free environments implemented in Primary Schools.

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Background & Aim: Evidence highlights children's heightened vulnerability to environmental tobacco smoke, often occurring in their homes and cars. In 2019, the "NESTE CARRO NÃO SE FUMA" project pilot commenced, targeting the reduction of tobacco exposure by discouraging its use in private vehicles. This study assesses the pilot conducted during the 2021/2022 academic year, aiming to enhance teacher involvement and minimize children's exposure to second and thirdhand smoke. **Methods:** For the evaluation of the pilot study, a qualitative multimethod approach was used, including semi-structured qualitative interviews and focus group with teachers who attended the initial teacher's training of the "NESTE CARRO NÃO SE FUMA" project. Six interviews and one focus group (consisting of six teachers from the same school) were conducted, resulting in a total of twelve participants. **Results:** The study utilized a qualitative multimethod approach to analyze findings, categorized into five themes. The "NESTE CARRO NÃO SE FUMA" project aimed to raise awareness about tobacco smoke risks among children and parents, promoting smoke-free vehicles. Teacher training increased awareness, but further exploration was suggested. Organizational feedback on materials varied. Implementation ranged from sporadic to consistent across classes. Barriers included monitoring, timing, teacher availability, and parental involvement, with proposed solutions. Suggestions for improvement included virtual activities, enhanced monitoring, increased parental involvement, adjusted training timing, structured calendars, and revised evaluations. The approach provided valuable insights for project refinement. **Conclusions:** This study shows the potential of the project to raise awareness about the risks of tobacco smoke exposure. However, certain areas require improvement to enhance its effectiveness so that the project can better achieve its objectives and contribute to promoting a smoke-free environment for children and their families.

Keywords: Secondhand smoke, Thirdhand smoke; Environmental Tobacco Smoke; Children

21542 | Dysfunction of visceral adipose tissue in human endometriosis

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Background & Aim: Endometriosis is a gynecological inflammatory disease with systemic manifestations characterized by the presence of ectopic endometrium. Endometriosis patients usually present low body mass index (BMI) and low overall adiposity(1), which evidences an inverse relationship between body fat and risk of disease. Also, miRNAs implicated in endometriosis were shown to induce browning of in vitro cultured pre-adipocytes(2). Thus, we hypothesize that endometriosis could underlie adipose tissue (AT) dysfunction and aim to evaluate inflammation and browning processes in AT of endometriosis patients. **Methods:** Visceral (VAT) and subcutaneous (SAT) AT samples were collected during surgeries of women with endometriosis or uterine myoma excision (controls) at Centro Hospitalar Universitário S.João-Porto. Catecholamine levels in blood were assessed by HPLC. Morphometric analysis of adipocyte area after H&E staining was performed. Expression of inflammatory (IL-6, MCP-1, Galectin-3, CD206, TIMP1, TGF- β) and browning-related (UCP-1, PGC-1 α , DIO2, CITED1, CIDEA, TMEM26, TBX1, PRDM16, PPAR- γ) molecules in AT was assessed by RT-PCR and Western Blotting. **Results:** An upregulation of the pro-inflammatory proteins IL-6 and MCP-1, as well as a reduction of CD206 was found only in VAT of endometriosis patients relatively to controls. However, no differences between groups were found in mRNA levels of IL-6, TIMP1 and TGF- β nor in Galectin-3 protein levels. UCP-1 and PGC-1 α proteins were upregulated only in VAT from endometriosis women, although browning genes' mRNA quantification did not support this finding. Morphometric analysis showed smaller adipocytes in endometriosis, especially in VAT. In blood of those patients, noradrenaline was diminished, but a trend of increased dopamine and epinephrine was seen. **Conclusions:** Taken together our findings support the view that endometriosis associates with a pro-catabolic state that correlates with VAT browning and the smaller diameter of adipocytes observed in those patients.

Keywords: Adipose Tissue, Browning, Endometriosis, Inflammation.

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21549 | The Other Side of Bupropion – Unravelling the *in vitro* Effects on Sperm

Vitality and Motility

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Background & Aim: Bupropion is an antidepressant used for the treatment of Major Depressive Disorder and for smoking cessation. Although it has not been linked to any sexual dysfunction, its impact on male fertility remains highly unknown and debatable¹. Only one case study involving a human subject has been conducted², and most of the research on this topic has been conducted *in vivo*, mainly on lab³ and domestic animals⁴. It is therefore essential to comprehend how bupropion affects reproductive function so that physicians and patients can use this medication with knowledge. This study aims to assess the iatrogenic impact of Bupropion's active metabolite, hydroxybupropion (OH-BUP), on human sperm *in vitro*. **Methods:** Human sperm of smoker and nonsmoker's normozoospermic patients (N=30) were cultivated for two hours in a humidified incubator with 5% CO₂ at 37°C, both in the presence and absence (control) of IC50 dose of OH-BUP. Conventional semen analysis was carried out following *in vitro* exposure in compliance with WHO recommendations⁵. The SPSS program version 29.0 was used to carry out the statistical analysis. **Results:** Vitality decreased from the pre-incubation (T0) group (74.5±1.2%) to the control (48.1±2.4%), but the decline was significantly (p<0.001) steeper when the group was exposed to OH-BUP (14.1±1.0%). In terms of motility, the total sperm motility in the control group was lower (38.6±3.1%) than in the T0 group (62.6±1.4%), although the difference was not statistically significant. The OH-BUP (1.6±0.4%) group exhibited a significant (p<0.001) decrease, a result of just 0.26% of slowly progressive sperm and the total absence of rapidly progressive sperm. **Conclusions:** These preliminary results are the first *in vitro* evidence of OH-BUP's detrimental effects on human sperm. The mechanisms underlying the reported effects, which already have significant therapeutic importance, require further investigation. **Keywords:** Reproductive Toxicity, Tobacco, Hydroxybupropion, Human Sperm Parameters.

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21567 | Epitranscriptomics and metabolism: relation between the FTO eraser and lactate production in renal cell carcinoma

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Background & Aim: Renal cell carcinoma (RCC) is the 14th most incident cancer worldwide, accounting for 155 953 of global cancer related deaths, according with GLOBOCAN 2022. The comprehension of the underlying mechanisms that drive the initiation and progression of this disease is of paramount importance, for optimizing approaches to prevention, detection, and treatment. Metabolic reprogramming, increasingly recognized as hallmark of cancer, plays a pivotal role in driving cellular transformations. Among these alterations, N6-methyladenosine (m6A) stands out as one of the most predominant methylation modification in human cancers. Our project focuses on elucidating the impact of m6A mRNA methylation on renal cell carcinoma (RCC) specific metabolic pathways. **Methods:** In silico analysis of The Cancer Genome Atlas (TCGA) dataset disclosed altered expression of the major m6A erasers, ALKBH5 and FTO, prompting subsequent validation. One papillary RCC cell line, ACHN, was used for FTO silenced using small interfering RNA (siRNA). FTO Knockdown was confirmed by RT-qPCR and western blot. To understand the effects on specific metabolic pathways, more specifically in LDHA and GLUT, we extracted the RNA, synthesize cDNA and performed RT-qPCR for transcript levels evaluation. The protein levels were also assessed by western blot. **Results:** FTO Knockdown reduced RNA and protein levels in 80% and 90%, respectively. These led to a decrease in GLUT RNA expression levels, while not impacting on LDHA transcript levels. Nonetheless, both GLUT and LDHA proteins were significantly reduced. **Conclusions:** Our data suggests that FTO plays a significant role in the metabolic dysregulation observed in renal cell carcinoma.

Keywords Renal Cell Carcinoma, N6-Methyladenosine, FTO.

Acknowledgments

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21573 | Development of new iron chelators targeting mitochondria with potential application in Friedreich ataxia

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Background & Aim: The Friedreich ataxia (FRDA) is considered the most common hereditary ataxia and is characterized by progressive cardio- and neurodegenerative effects [1]. FRDA is caused by a trinucleotide repeat expansion in the first intron of the frataxin (FXN) gene on chromosome 9, resulting in gene silencing and a decrease in FXN, a mitochondrial matrix protein involved in ATP production and iron homeostasis [2;1]. The consequences of FXN deficiency include mitochondrial iron accumulation, cellular iron dysregulation, increased sensitivity to oxidative stress and mitochondrial dysfunction. Some of the molecular mechanisms of FRDA also trigger oxytosis/ferroptosis, a form of iron-induced cell death [3;4]. Despite massive efforts, there is no current approved drug to prevent/delay the progression of FRDA. Thus, finding a therapy is a major unmet medical need. The main aim of this work is to develop innovative compounds with iron chelating/antioxidant properties to prevent mitochondrial dysfunction and ferroptosis based in Deferiprone (DFP), an iron chelator approved for the treatment of Thalassemia. **Methods:** Structural modifications were done to DFP ring by conjugation to lipophilic cations through an alkyl spacer with variable length. Structural characterization of the new compounds was carried out by NMR (¹H, ¹³C and DEPT) spectroscopy. The evaluation of antioxidant activity and iron-chelating capacity will be done using spectrophotometric/fluorometric assays. The drug-like properties that impact the compounds' ADME-Tox profile (e.g.: lipophilicity, solubility) will be done using HPLC techniques. **Results:** At least 4 compounds derived from DFP have been obtained. The study of bioactivity and drug-like profile of these compounds are in progress. The results obtained so far will be presented in this communication. **Conclusions:** The compounds synthesized in this work could promote the development of new drugs targeting mitochondrial dysfunction resulting from FRDA.

Keywords: Deferiprone, Friedreich Ataxia, Mitochondrial Therapy, Oxytosis/Ferroptosis.

Acknowledgments

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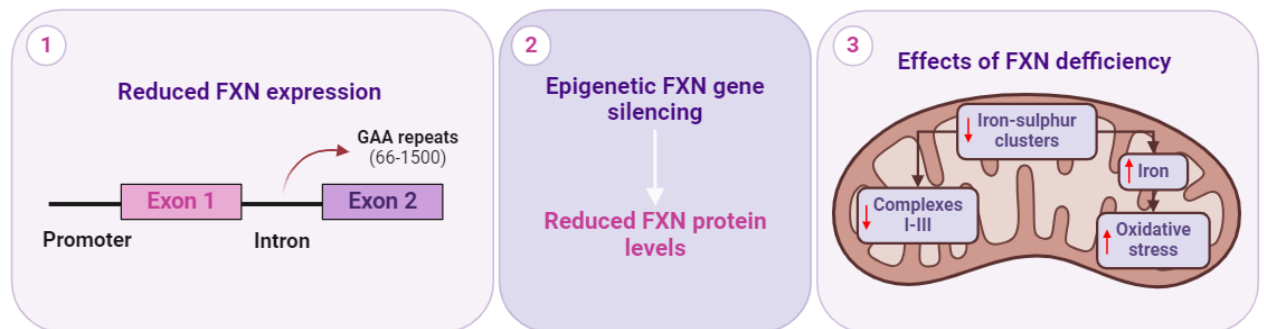


Figure 1: Consequence of the GAA repeat expansion resulting in Friedreich ataxia. Adapted from: De Michele, G., Filla, A. - Friedreich Ataxia Today - Preparing for the Final Battle. *Nature Reviews Neurology*. **2015**, 11, 188-190. doi:10.1038/nrneurol.2015.33

21608 | The role of cytotoxic granule-associated RNA binding protein TIA-1 in stress-driven Tau pathology

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Background & Aim: Alzheimer's Disease is a neurodegenerative disorder, characterized by A β plaques and intracellular neurofibrillary tangles of Tau, with known risk factors including age and sex, and new evidence suggesting that stressful life experiences as risk factors. Align with clinical evidence, in vivo and in vitro studies have shown that chronic stress and glucocorticoids, trigger AD neuropathology, inducing Tau aggregation[1, 2], and pathological missorting of Tau leading to synaptic damage. We also know that stress disrupts RNA-binding proteins (RBPs) and mRNAs homeostasis leading to the formation of stress granules (SGs)[2], implicated in AD pathology. In addition, TIA1, a key RBP for the induction of SG, reduction inhibits Tau aggregation and related neurotoxicity[3], suggesting causality between the above mechanisms. This project aims to elucidate the role of TIA1 in stress-driven SG formation, Tau pathology, and neuronal and synaptic toxicity, in both neurons and microglia. **Methods:** Conditional TIA1-KO model was created using CAMK2a (nTIA1-cKO) for neuronal deletion and CX3R1 (mTIA1-cKO) for microglia deletion, in the P301L background. nTIA1-cKO mice were subjected to a chronic unpredictable stress protocol (6 weeks), followed by behavior assessments for depression, anxiety, and cognition. Stress efficacy was monitored by body weight and corticosterone levels. Molecular and neurostructural analysis will evaluate the impact of TIA1 deletion in stress-induced Tau pathology, RBPS dysfunction and SG formation, and consequent neurostructural damages, by Golgi-Cox analysis. **Results & Conclusions:** So far, we observed that nTIA1 deletion has no effects on WT or protection against stress; while in P301L-Tg mice, conditional deletion of TIA1 seems to be protective against stress-induced cognitive damage, and is protective for Tau-pathology-induced anxiety deficits. Ongoing biochemical analyses aim to understand the impact on neurons and spines, as well as on Tau aggregation, and stress granule formation.

Keywords: Chronic Stress, Stress Granules, Tau Protein, RNA-Binding Protein, TIA-1.

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21610 | High throughput screening of heterocyclic compounds to identify new spindle assembly checkpoint inhibitors

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Background & Aim: Chromosomal instability (CIN) is a common trait of cancer characterized by the continuous gain and loss of chromosomes during mitosis. However, excessive levels of CIN can suppress tumour growth, providing a possible therapeutic strategy [1]. The Spindle Assembly Checkpoint (SAC), a cell surveillance system required for the fidelity of chromosome segregation, has been one of the prime targets to explore this concept. Severe SAC inactivation results in levels of aneuploidy beyond the adaptation capacity of cancer cells, hence culminating in cell death [2]. We previously identified one Aurora B inhibitor that killed almost 100 % of cancer cells in culture, with little toxicity to normal cells. With the aim of improving its therapeutic window, several analogs of the Aurora B inhibitor (INLs) were synthesized. An in-house library of heterocyclic compounds (MACs) was also screened to potentially identify new hit compounds. **Methods:** INLs were synthesized through a nucleophilic aromatic substitution, and their structural elucidation was performed by nuclear magnetic resonance. Using an automated screening instrumentation, INLs and MACs were tested for their ability to induce mitotic slippage in cells blocked in mitosis by nocodazole. The most promising compounds were then tested for their toxic effect in healthy and cancer cell lines and for their ability to inhibit Aurora B by immunostaining. **Results:** MACs were unable to induce mitotic slippage. Eight INLs were successfully obtained, and their anticancer properties are currently under evaluation. The results obtained so far will be included in this communication. **Conclusions:** Collectively, the data obtained provide new insights into the discovery of new anticancer agents targeting SAC.

Keywords: Spindle Assembly Checkpoint, High Throughput Screening, Heterocyclic Compounds, Anticancer.

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21612 | Exogenous administration of delta-9-tetrahydrocannabinol affects adult hippocampal GABAergic and cholinergic transmission in female Wistar rats

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Background & Aim: Delta-9-tetrahydrocannabinol (Δ 9-THC) is the main psychoactive constituent of *Cannabis sativa*, whose derivatives are the most widely consumed psychoactive substances for recreational purposes worldwide. In addition, the therapeutic applicability of this compound has been proven, and its use is promising in the treatment of various pathologies [1,2]. It is a partial agonist of CB1 and CB2 receptors, the cannabinoid receptors that are part of the endocannabinoid system. This system is involved in several physiological activities, including learning and memory processes [3, 4, 5]. The conclusions regarding the impact of Δ 9-THC on cognition are controversially discussed in the literature, although it is known that dysregulation of the endocannabinoid system contributes to a variety of neuropsychiatric disorders [4, 5]. In our study, we investigated the effects of the administration of THC in female Wistar rats by examining the hippocampal formation (HF) to evaluate the existence of changes in the GABAergic and cholinergic systems. We hope that our results may help with decision-making regarding the prescription of low doses of THC as a therapeutical approach. **Methods:** Female Wistar rats were subjected to gonadectomy under anesthesia at 8 weeks old. After that, they received estradiol benzoate (EB) and THC. We randomly selected tissue sections containing the hippocampus at a sampling ratio of 1/12 and used them for immunohistochemistry with the goal of assessing the expression of GAD and VAChT. **Results:** In a generalized way, both estradiol and THC reduce GAD expression when used alone but increase GAD expression when they are used together. When it comes to VAChT, the administration of estradiol alone reduces its expression in CA1 and CA3, while the addition of THC increases its expression. **Conclusions:** Our study provides new insights into the effects of THC in memory and learning in female rats, which can lead to future applications in the pharmacological industry.

Keywords: Hippocampal Formation, Delta-9-Tetrahydrocannabinol, Gabaergic System, Cholinergic System

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21615 | Characterization of an injectable hydrogel based on thermosensitive polymers for biomedical applications

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Background & Aim: There has been a significant increase in the development of polymeric biomaterials, with hydrogels standing out, widely applied in pharmaceutical preparations and in the biomedical field due to their hydrophilic and biocompatible properties. Hydrogels exhibit similarities to the body's tissues and are, therefore, non-toxic. Hydrogels based on smart polymers can alter their characteristics in response to small variations in environmental conditions, such as pH, temperature, ionic strength, among others. For certain administration routes, such as parental, it is crucial for formulations to meet specific requirements namely sterility. Therefore, it is essential to study the impact of sterilization methods on preserving the integrity of pharmaceutical forms based on hydrogels composed of stimuli-responsive polymers. This work aimed to study the effect of steam heat sterilization on the properties of hydrogels based on smart polymers, particularly Pluronic® F-127 (PF127) hydrogels. **Methods:** The properties of different prepared hydrogels, including rheological behavior, injectability, gelation time and temperature were evaluated to compare and identify differences between sterilized and non-sterilized PF127 hydrogels. **Results:** Analysis of the results revealed that sterilization induced changes in the sterilized PF127 hydrogel, affecting parameters such as sol-gel phase transition temperature, gelation time and injectability. **Conclusions:** Steam heat sterilization might not be the most suitable method for PF127 hydrogels, as it could affect the properties of this type of hydrogels.

Keywords: Hydrogels, Smart Polymers, Poloxamers, Injectable Preparations, Sterilization.

21636 | A Broad Analysis of Robotic Surgery: Advancements, Applications and Trends

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Background & Aim: Minimally invasive surgical procedures, with maximised precision, ergonomics and safety can be achieved through robotic surgery. Advances in artificial intelligence and nanotechnology create promising future perspectives in this area. However, it is crucial to consider all possible obstacles associated with this innovation. In this study, we perform a narrative review of literature to address the following question: what are the latest advancements, current applications and future trends of robotic surgery? **Methods:** A literature search was conducted on PubMed® database on the 29th December 2023 using the term “robotic surgery” on the title field and NOT operator to exclude specific pathologies or surgeries. A total of 723 studies were obtained. After initial triage, a total of 141 articles were fully read and 26 studies were ultimately included. **Results:** In order to understand robotic surgery origins, its current state of art and what the future might hold, we addressed its historical development, current technologies, clinical applications, robotic surgery versus conventional techniques, financial impact and accessibility, training and future perspectives and challenges. **Conclusions:** The beneficial impact of robotic surgery was established through innovative surgical procedures. The increasing precision, efficiency and safety, as well as the vast medical specialities where it is already a common practice are proof of that. Nevertheless, issues emerge alongside its evolution both in technical, ethical, moral and financial topics. Some highlights include the extensive costs of robotic surgery implementation that are too high for many countries [1]; the urgent need for legal consensus as, in the case of litigation, conflicts are frequent as different parties are involved [2]; the need for standard training programs that currently lack both simulation and real clinical experience, as well as standardized performance metrics [3].

Keywords: Robotic Surgery, Narrative Review.

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21647 | Deciphering neuroimmune interactions in alcohol intake in mouse model of intermittent access in male and female

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Background & Aim: Excessive alcohol consumption continues to pose a significant global health challenge, with detrimental effects on millions of individuals. Our laboratory has shown that alcohol exposure triggers reactive changes in astrocytes, including alterations in gene expression, activity, and proliferation, while also affecting microglial morphology and immune responses (1). We are to characterizing the effects of chronic alcohol consumption using a well-established voluntary alcohol drinking model in adult mice, to investigate the impact of chronic alcohol exposure on the prefrontal cortex (PFC), focusing on glial cell morphology, synaptic density, and behaviour. **Methods:** Mice are exposed to intermittent “every-other-day” (EOD) access to alcohol 15% (v/v) for 3 weeks, and behaviourally tested for anxiety, depression and memory, before sacrifice at 21 days of alcohol, or at 7 days of withdrawal. Brains were processed for glial cell analysis. **Results:** Our preliminary findings revealed sex-specific responses following chronic alcohol exposure. Male mice exhibited increased astrocyte volume in the ventromedial PFC (vmPFC) and hyper-ramification in the ventrolateral PFC (vlPFC), whereas females displayed reductions in astrocyte size and complexity. Microglia morphology also differed between sexes, with females showing increased cell volume and males displaying reduced microglial volume in the vlPFC. These results suggest distinctive immune and synaptic responses to ethanol in males and females. Of note, we observed heightened inhibitory synapse density in the male PFC, while females exhibited increased excitatory synapse density. We are now conducting a proteomic analysis of PFC synaptosomes to identify important molecular targets in the crosstalk between neuros and glial cells. **Conclusions:** With this work we expect to clarify the complex interplay between chronic ethanol exposure, sex, and PFC function, find also new targets for innovative therapeutic approaches.

Keywords: Alcohol Use, Neuroinflammation, Sex Differences.

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21656 | Prognostic factors in genetic acute myocarditis – a systematic review and meta-analysis

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Background&Aim: Myocarditis is a heterogeneous disease with various clinical presentations, aetiologies and courses and such heterogeneity is a matter of investigation. The literature suggests that apart from environmental factors, it may also be related to genetic predisposition.¹In this systematic review, we aim to understand the clinical presentation and prognosis of patients with a predisposed genetic background when compared with patients without genetic burden. **Methods:** This study was conducted according to the PRISMA statement². The literature search was done in two electronic databases: MEDLINE and WebOfScience. Statistical analysis of comparative data between cases with a positive and negative test included in meta-analysis was conducted. **Results:** The prevalence of a positive genetic test result was 28.4%, with a higher proportion of males (61.3%) than females and family history of cardiovascular events in family members was reported in 53.3% cases. The presence of a positive test was frequently observed in patients with unfavourable outcomes such as the development of ventricular arrhythmias (13.3%), recurrency of acute myocarditis episodes (30.7%), heart failure (5.8%), need for an implantable cardioverter-defibrillator (3.2%), heart transplantation (27.4%), requirement of extracorporeal hemodynamic support (53.3%) and cardiovascular death (8.9%). The meta-analysis did not yield any statistically significant findings. **Conclusions:** This is the first systematic review with meta-analysis studying this hypothesis. Patients with acute myocarditis and a positive genetic test had a high frequency of past medical family history of cardiovascular, and of LGE in CMR, suggesting that patients with these clinical features may represent a population with higher burden of genetic background and risk for worse outcomes. Overall, these findings emphasize the importance of identifying affected individuals who may benefit from genetic testing. More data is required before recommending the implementation of genetic tests in clinical practice.

Keywords: Genetic Myocarditis, Acute Myocarditis, Genetic Burden.

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21659 | Metabolomic signatures for the diagnosis of bladder cancer

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Background & Aim: Bladder cancer (BC) is the 10th most common form of cancer worldwide [1]. This type of cancer is divided into non-muscle invasive BC (NMIBC) and muscle invasive BC (MIBC) [2]. The standard diagnostic approaches currently used for BC are limited by lack of sensitivity and invasiveness [2]. Therefore, novel non-invasive biomarkers are needed to accurately detect and classify BC cases. In this work, we used a gas chromatography-mass spectrometry (GC-MS)-based metabolomics approach to discriminate urine samples from patients diagnosed with BC and cancer-free controls. **Methods:** Urine samples collected from BC patients ($n=68$ NMIBC and $n=30$ MIBC) and cancer-free controls ($n=94$) were derivatized and analyzed by GC-MS. Metabolite identification was performed by comparing the mass spectra of each peak with a mass spectral library and standard compounds. Data processing included peak alignment, normalization (total area), and logarithmic transformation. The processed data were analysed by multivariate methods [principal component analysis (PCA), partial least squares discriminant analysis (PLS-DA)] and univariate methods (volcano plot, Mann-Whitney U test, and Kruskal-Wallis test). **Results:** Fifty metabolites were identified in urine by GC-MS. The PLS-DA model showed a tendency for separation of BC and control cases. Among the fifty metabolites identified, seven metabolites showed significant differences between BC and control groups. The levels of lactic acid and proline were significantly increased in BC samples compared to controls, whereas sucrose and aminomalonic acid were significantly decreased. In addition, glyceric acid levels were significantly lower only in NMIBC cases when compared to controls. The MIBC cases had significantly higher urinary levels of stearic acid, valine, lactic acid, and proline when compared to NMIBC cases. **Conclusions:** These results revealed a distinct urinary metabolomic profile in BC, providing a candidate biomarker panel to improve BC detection.

Keywords: Bladder Cancer, Metabolomics, Gas Chromatography-Mass Spectrometry, Biomarkers, Urine.

Acknowledgments

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21663 | AHR-Melanoma Dynamics: sensing and shaping a melanoma code

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Background & Aim: Melanoma is a highly aggressive form of skin cancer characterized by the malignant transformation of melanocytes, which is associated with several risk factors, including exposure to ultraviolet radiation (1). Among the various signaling pathways implicated in melanoma pathogenesis, the Aryl Hydrocarbon Receptor (AHR) has emerged as a player with multifaceted roles in tumour biology (2). The AHR is a ligand-activated transcription factor known for its involvement in various cellular processes, including xenobiotic metabolism, proliferation, and immune evasion (3). Evidence suggests that sustained activation of AHR has a pro-tumorigenic role in melanoma as well as immune escape and therapy resistance (4). Previous findings from our research group indicate that the AHR can detect bacterial pigments, thereby playing a role in the modulation of immune responses to infection (5). Moreover, preliminary data from our lab showed that the AHR can sense pigmentation-related molecules, hence we hypothesized that the AHR also plays a role in regulating pigmentation itself. **Methods:** The B16F10 mouse melanoma cell line was used, and we performed gene expression analysis to access the expression of AHR, AHR-dependent genes (e.g., *Cyp1a1*) as well as pigmentation genes (e.g., *Tyr*, *Dct*), after exposure to AHR agonists or pigmentation inducing conditions. We also quantified these cells' extracellular and intracellular melanin contents. **Results:** Our data from gene expression analysis showed an induction in the pigmentation genes correlated with AHR-dependent genes. Moreover, we observed an increase in melanin contents upon AHR activation. **Conclusions:** Our data suggest that the AHR, besides sensing pigmentation-related molecules produced by these cells, also regulates melanogenesis. We are currently developing the B16F10 *Tyr*-KD cells to confirm the involvement of AHR in the regulation of melanogenesis and evaluate its potential crosstalk with other signaling pathways involved in this process.

Keywords: Melanoma, Skin, Aryl Hydrocarbon Receptor, Pigmentation.

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21669 | Human granulomas *in vitro*: a 3D model to study host-pathogen interactions

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Background & Aim: Tuberculosis (TB) is caused by *Mycobacterium tuberculosis* (Mtb) and the second leading infectious disease killer worldwide. Granulomas are the hallmark of TB, being beneficial to contain the pathogen, but also detrimental to the host by providing a niche for the bacteria. Human 3D granuloma *in vitro* arises as a promising new model to study Mtb-induced granulomas, as they are from human source and more complex than 2D cultures, thereby being more representative than other *in vitro* models. With this, the aim of this study is to implement a human 3D granuloma *in vitro* model and evaluate the host response to pathogen diversity.

Methods: Peripheral blood mononuclear cells (PBMCs) isolated from consenting human donors were infected with Mtb isolates and distributed in 24-well plates. The collagen and fibronectin-based matrix was added to facilitate a 3D conformation. Granuloma structure and infection progression were assessed by microscopy. After 7 days of infection, granulomas were retrieved to evaluate colony-forming units (CFU). **Results:** As reported previously, donor heterogeneity in forming granulomas was observed in these samples. Preliminary results using fluorescent reporter strains, demonstrate that the bacteria are in the center of the granuloma after 7 days of infection, resembling the typical bacteria distribution in a granuloma structure. Currently, CFU quantification are being assessed to correlate it with results from microscopy (fluorescent-bacteria quantification). **Conclusions:** Granulomas *in vitro* can fill gaps in the current knowledge and bring novel insights to uncover the mechanisms within host-pathogen interactions during early stages of infection in humans. Future studies will focus on analyzing the differences when using different Mtb isolates, regarding immune cell composition and distribution as well as cytokine expression and secretion.

Keywords: Tuberculosis, *Mycobacterium Tuberculosis*, Granuloma, 3D *In Vitro*.

21673 | Proteomics Characterization of Human Uterine Samples During Reproductive Ageing

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Background & Aim: Nowadays, postponing motherhood has become more common in modern societies. Such decision rises major social and health concerns, as advanced maternal age associates with low fertility, pregnancy complications and a greater need for assisted reproductive techniques. Female reproductive ageing is associated with alterations that are particularly evident in the ovaries. Yet, given the pivotal contribution of the uterus to embryo adhesion, implantation, and fetal development⁶, we believe that age-dependent uterine changes impair fertility. Evidence in mice already reported age-associated uterine changes^[1]. Also, albumin carbonylation was found increased in uterine samples from older term-pregnant women^[2]. Moreover, preliminary data show changes in composition and oxidation status of uterine extracellular matrix proteins with higher maternal age. We hypothesize that the uterine proteome changes during reproductive ageing, impairing tissue structure and function. This study aims to identify age-related alterations in uterine protein composition through a complete proteomics approach. **Methods:** Uterine samples were collected during c-section from term-pregnant women and immediately fixed for paraffin-embedding or frozen for molecular analysis. Six samples were selected: three from younger and three from reproductively aged women. Paraffin-embedded samples were histologically analyzed after H+E staining. Protein lysates were obtained after sample homogenization and total protein content was determined and were then separated by SDS-PAGE, stained with Coomassie Blue, and will be subjected to a MS based proteomics study. **Results:** Histological analysis of the samples has proven their uterine origin.

SDS-PAGE results confirmed the successful protein extraction. **Conclusions:** The identification of uterine proteins differentially expressed according to maternal age will allow the development of therapeutic approaches, aiming to attenuate age-associated female fertility decline.

Keywords: Reproductive Ageing, Female Infertility, Uterine Proteome.

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21680 | Maxillary sinus lifting: how to measure the results of bone regeneration? A retrospective study comparing measurement techniques.

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Background & Aim: Sufficient bone volume is a core condition for oral rehabilitation with dental implants. In the posterior maxilla, the lack of bone volume is frequently observed due to sinus' pneumatization and excessive alveolar bone resorption, precluding the implant insertion. Maxillary sinus floor elevation (MSFE) is a surgical procedure that can restore the bone volume of this region, allowing its rehabilitation^{1,2}. Quality imaging exams such as Cone Beam Computed Tomography (CBCT) are pivotal to plan a MSFE procedure, allowing a three-dimensional visualization of the surgical site. Currently, there are different protocols to quantify the bone gains of regenerative surgeries^{3,4}. Thus, the aim of this study is to employ a specific protocol to quantitatively characterize the bone gains of MSFE procedures. **Methods:** This retrospective study was approved by the competent authority (REF n° 6.596.542). Imaging CBCT scans obtained from the database of São Leopoldo Mandic University (Campinas, SP - Brazil) from patients that underwent to MSFE procedure will be used to reconstruct the maxillary sinus region using CS 3D Imaging Software - Carestream. Reconstructs will be analyzed before and after the MSFE procedure relying on an established protocol. Tools available in the Carestream software will be used to measure and illustrate the bone gain. For vertical bone defects measurement will be performed from the viable edge of the alveolar bone crest to the limit of the graft, while the bone gain will be measured perpendicularly at the 5 mm-mark from the edge of the remaining bone crest for horizontal augmentations. This study will demonstrate and elucidate the application and reproducibility of the protocol in quantifying the bone augmentation in MSFE procedures.

Keywords: Cone Beam Volumetric Tomography - Maxillary Sinus Lift - Dental Implants.

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21684 | Influence of the bone graft substitute in the biological response to zirconia implants: an *in vitro* study

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Background & Aim: Several innovative ceramics have been explored as materials for dental implants, out of which 3-YTZP zirconia oxide showed the most promising results in terms of osseointegration¹. Furthermore, an important aspect of implant dentistry is the need for regenerative bone procedures with graft materials, in situations where the host bone volume is insufficient for an ideal implant placement. Since zirconia exhibits an osteoconductive nature², the question arises as to whether the properties of the bone grafts, placed in conjunction with the implants, may influence the regenerative outcome and the osseointegration process. To explore this, an *in vitro* study will be established to evaluate the cellular response of human osteoblastic cells, grown over zirconia substrates, in the presence of bone graft materials with different physicochemical properties. **Methods:** MG63 osteoblastic cells growing on zirconia discs will be placed in intimate contact with distinct bone graft materials namely, a xenograft; an activated bio-glass; a synthetic composite graft; and no graft (control group). At distinct time points, osteoblastic cell morphology, viability, proliferation, pattern of cell growth, and phenotypic/genotypic profile will be assessed. **Results:** This study is poised to contribute significantly to our understanding of cellular biology in response to distinct modulatory environments, modulated by the presence of distinct bone grafts. Anticipating diverse responses from each graft material, we aspire to uncover the specific ways in which the cellular response over zirconia may be modulated by the selected characteristics of these materials. **Conclusions:** This study elucidates the impact of various bone graft materials on the osseointegration of zirconia dental implants, offering valuable insights for optimizing regenerative dental procedures.

Keywords: Zirconia, Bone Substitutes, Regeneration.

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21709 | Lipid droplets as players in rectal cancer radioresistance?

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Background & Aim: Rectal cancer (RC) is the 7th most incident malignancy worldwide, with an expected increase, by 2030, of 124% in patients from 20-34 years. Neoadjuvant radiotherapy (RT) is frequently used as a treatment once more than 50% of the patients present advanced disease at diagnosis. However, approximately 30% of the tumours are or become resistant to RT, being imperative to dissect radioresistance mechanisms to unveil novel targets to sensitize tumours and expand RC therapeutic options. **Methods:** Previous work by our lab has shown that irradiation deregulates lipid metabolism, being a promising mechanism of cancer cell survival upon radiotherapy. Therefore, in order to explore this possible mechanism of radioresistance, we developed a 3D spheroid model, containing, rectal cancer cells (SW837), macrophages and T-cells. Spheroids were irradiated mimicking the standard short-scheme of rectal cancer patients (5 days x 5Gy). After treatment, control and irradiated spheroids were analysed by flow cytometry and transmission electron microscopy. **Results:** Collected data indicates that radiotherapy increases lipid droplets (LD) and mitochondria numbers, as well as the area of LD and LD-mitochondria contact points, over time. Additionally, LD with different lipid densities suggested to be present upon radiotherapy. Moreover, the impact of irradiation on the expression of cancer stem cell markers (CD24, Cd44) and of cholesterol-binding protein (CD133) are currently being analysed. **Conclusion:** These data highlight a possible radioresistance mechanism through which rectal cancer cells modify their lipid metabolism to escape RT-mediated cell death. In the future, we will explore this phenomenon and validate the candidate molecules in patients rectal cancer biopsies (before RT) and surgical resections (after RT). If

validated, these candidates may constitute excellent targets for novel therapeutic approaches to sensitize tumours to RT.

Keywords: Rectal Cancer, Radioresistance, Tumour Microenvironment, Lipid Droplets.

21726 | Transthyretin Amyloidosis: *in vitro* Proteolysis and Aggregation Mechanisms in Cardiac Cells

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Transthyretin (TTR) amyloidosis (ATTR), a subgroup of protein-misfolding diseases, is characterized by systemic extracellular deposition of misfolded TTR aggregates in various organs of the body, leading to significant disability and ultimately to organ dysfunction and death. Its primary clinical manifestations are polyneuropathy and cardiomyopathy. These aggregates consist of both wild-type TTR (TTRwt) and variants (TTRv), resulting from mutations in the TTR gene. TTR amyloid formation is mainly due to two mechanisms: TTR destabilization and proteolysis. The prevalence of hereditary ATTR is estimated to be around 50,000 individuals worldwide, therefore, understanding these pathways is crucial. We have previously characterized the aggregation of TTRwt and TTRv under proteolytic conditions and evaluated their cellular toxicity in HL-1 cardiomyocytes. As no obvious effects were observed, we hypothesized that this cell line was insensitive to the aggregates. Furthermore, TTR deposits have been found to affect cardiac fibroblasts. This highlights the importance of studying different cell models to determine the complexity of TTR-related diseases. Here, we aim to enhance the understanding of the processes and mechanisms involved in amyloid formation through *in vitro* studies using mouse cardiac fibroblasts. Our plan is to expose cardiac fibroblasts to TTRwt and TTRv aggregated under different conditions, evaluate cell viability and apoptosis, and examine caspase activation and biomarkers of disease using western blot analysis. We expect to find increased toxicity in cardiac fibroblasts exposed to TTR (wt or variants) subjected to proteolysis as compared to non-cleaved TTR. ATTR amyloidosis is a challenging and complex disease that requires further investigation to fully understand its mechanisms. *In vitro* models provide valuable insights into TTR proteolysis and aggregation mechanisms in cardiac cells, and these studies can contribute to a better understanding of ATTR-related diseases.

Keywords: amyloid fibers; amyloidosis; cardiac fibroblasts; protein aggregation; transthyretin.

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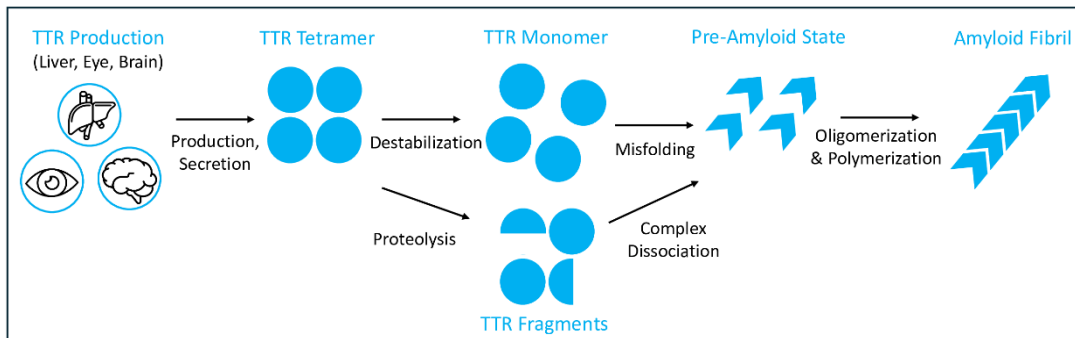


Figure 4: The amyloidosis pathways of TTR.

21734 | Targeted host and pathogen factors underlying modulation of myeloid cell responses to *M. tuberculosis* L6

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Tuberculosis (TB) is one of the deadliest, and most devastating infectious diseases, affecting more than 10.6 million individuals and causing over 1.3 million deaths annually. Two key factors underline the diversity of TB outcomes, the host immune response and the pathogen diversity. The *Mycobacterium tuberculosis* complex (MTBC) comprises nine genetically distinct human-adapted lineages (L) associated with different TB outcomes. For example, infections with *M. tuberculosis* isolates belonging to L4 are associated with a high rate of progression to active TB as well as more debilitating disease. On the other side, infections with *M. tuberculosis* of L6 have been associated with slow progression to disease both in humans and mice. Our goal is to understand the host and pathogen factors that dictate slow-progressing TB. We are currently testing *in vitro*, the macrophage immune responses to *M. tuberculosis* L4 and L6 when the action of key cytokines, described as playing major roles in the host immune response to TB, are blocked. For that, we are using bone marrow-derived macrophages (BMDM's) deficient for IL10R, IL1R and TNF-alpha. In parallel, we are addressing the pathogen factors that modulate these differential immune responses. Therefore, we are testing different inhibitors of the pathogen, targeting key components for bacterial growth and survival, aiming to identify new possible targets informed by the differences between the two pathogens. Consequently, it is expected that this research will help elucidate the functional mechanisms ultimately contributing to the slow disease progression associated with *M. tuberculosis* L6, which is essential for the development of new strategies for controlling the TB burden.

Keywords: *Mycobacterium tuberculosis*, pathogen diversity, disease progression, macrophages, Immune response

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21744 | Transthyretin Amyloidosis: *in vitro* Proteolysis and Aggregation Mechanisms in Cardiac Cells

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Transthyretin (TTR) amyloidosis (ATTR), a subgroup of protein-misfolding diseases, is characterized by systemic extracellular deposition of misfolded TTR aggregates in various organs of the body, leading to significant disability and ultimately to organ dysfunction and death. Its primary clinical manifestations are polyneuropathy and cardiomyopathy. These aggregates consist of both wild-type TTR (TTRwt) and variants (TTRv), resulting from mutations in the TTR gene. TTR amyloid formation is mainly due to two mechanisms: TTR destabilization and proteolysis. The prevalence of hereditary ATTR is estimated to be around 50,000 individuals worldwide, therefore, understanding these pathways is crucial. We have previously characterized the aggregation of TTRwt and TTRv under proteolytic conditions and evaluated their cellular toxicity in HL-1 cardiomyocytes. As no obvious effects were observed, we hypothesized that this cell line was insensitive to the aggregates. Furthermore, TTR deposits have been found to affect cardiac fibroblasts. This highlights the importance of studying different cell models to determine the complexity of TTR-related diseases. Here, we aim to enhance the understanding of the processes and mechanisms involved in amyloid formation through *in vitro* studies using mouse cardiac fibroblasts. Our plan is to expose cardiac fibroblasts to TTRwt and TTRv aggregated under different conditions, evaluate cell viability and apoptosis, and examine caspase activation and biomarkers of disease using western blot analysis. We expect to find increased toxicity in cardiac fibroblasts exposed to TTR (wt or variants) subjected to proteolysis as compared to non-cleaved TTR. ATTR amyloidosis is a challenging and complex disease that requires further investigation to fully understand its mechanisms. *In vitro* models provide valuable insights into TTR proteolysis and aggregation mechanisms in cardiac cells, and these studies can contribute to a better understanding of ATTR-related diseases.

Keywords: Amyloid Fibers, Amyloidosis, Cardiac Fibroblasts, Protein Aggregation, Transthyretin.

Acknowledgements

This work is under the scope of PTDC/MED PAT/0959/2021, financed by national funds through FCT– “Fundação para a Ciência e a Tecnologia”, I.P/MCTES, PIDDAC.

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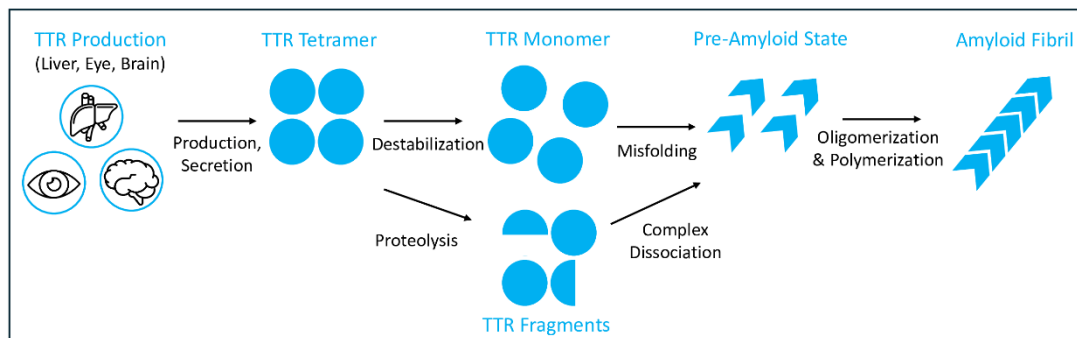


Figure 5: The amyloidosis pathways of TTR.

21758 | Chemical characterization of body odour by gas chromatography-mass spectrometry

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Background & Aim: Body odor is the result of the secretion of water, salt, acids, oil/wax, and proteins, among others, by sweat glands in the skin and hair. It is a valuable tool in medical, forensic, and biometric fields due to its non-invasive nature and easy accessibility. Gas chromatography-mass spectrometry (GC-MS) is the standard analytical method for body odor analysis due to its high sensitivity, resolution, and separation capacity. The aim of this work was to identify the volatile composition of human axillary odor by GC-MS. **Methods:** Axillary sweat was collected of three female participants using cotton pads. The study was approved by the Ethics Committee of the Faculty of Pharmacy, University of Porto, and the participants signed an informed consent form. Volatile compounds were extracted from cotton pads using two different methods, namely headspace solid-phase microextraction (HS-SPME) and solvent extraction (dichloromethane). The headspace and solvent extracts were analyzed by GC-MS and the volatile compounds were identified using a mass spectral library. **Results:** A total of 13 volatile compounds were identified by HS-SPME. The most common chemical classes identified by this method were alkanes, alcohols, and ketones. Acids, aldehydes, benzenoids and esters were found to a lesser extent. Solvent extraction allowed the detection of 16 semi-volatile compounds, mostly from chemical classes such as acids, sterol derivatives and amines. Triterpenoids, benzenoids and esters of fatty acids were found in lesser extent in the dichloromethane extraction. Some of the compounds detected have known odor descriptors, such as isopropyl palmitate, which has a fatty odor, and acetic acid, which has a sour odor. **Conclusions:** The results present a collection of volatile and semi-volatile compounds detected in axillary odor that can potentially reveal a distinct personal or gender-specific odor signature.

Keywords: Body Odor, Gas Chromatography-Mass Spectrometry, Volatile Compounds, Odor Signature

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21769 | Microbiological Challenges of Insect-derived Food Products

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Background & Aim: Insect-derived food products have been proposed as a potential solution to address demographic growth in western countries. Insects are regarded as a nutritious and markedly more sustainable food source compared to traditional animal protein sources (1). Recently, the European Commission approved four insect species for use as food ingredients in the EU market, sparking increased interest in their production for insect-based products. However, there are still barriers to overcome, particularly concerning the potential microbiological hazards they may pose (2). The goal of this study was to assess the literature, identifying production stages that may raise concerns and examining the associated microbiological risks. **Methods:** A search was conducted in the databases PUBMED and Google Scholar (up to May 2023), as well as in major food authorities (EFSA and FAO), using the keywords “edible insects” and “microbiology”. The inclusion criteria comprised safety reports, reviews, and systematic reviews, that aligned with our research goals. **Results:** Microbial contamination and/or growth may occur at any stage of insect production. Several major poor practices and microbial hazards were identified in each stage: i) Insect creation, inadequate bio-safety conditions, with spore-forming bacteria (e.g., *Bacillus cereus*, *Clostridium perfringens*), and non-typhoid *Salmonella*; ii) Insect slaughter, contact between insects and excrement (e.g., pathogenic *Escherichia coli*); iii) Processing phase, contamination by food handlers (e.g., *Staphylococcus aureus*); iv) Transport: Refrigeration failure, with spore-forming bacteria (e.g., *Bacillus cereus*, *Clostridium perfringens*) (2,3) **Conclusions:** While every stage in insect production is critical, the analysis of literature on production stages and microbiological risks reveals that, with adequate control and prevention measures throughout the entire production chain, insects can indeed emerge as a safe and sustainable protein alternative in our diet.

Keywords: Edible Insects, Microbiology, Microbiological Hazards, Food Chain.

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21772 | Decoding Immunomodulatory Interactions: Exploring the crosstalk between bone marrow-derived mesenchymal stem cells (BM-MSCs) out the bag and peripheral blood mononuclear cells (PBMCs) for potential in-vivo immunosuppression

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Background & Aim: Allogeneic hematopoietic stem cell transplant is vital for haematological diseases, yet chronic complications arise as donor immune cells start attacking patient tissues. A lab barrier to studying this alloreactivity is the absence of the hematopoietic stem cell niche. Here, we employed BM-MSCs from discarded collection bags [1] to solve this hurdle. The aim was to modulate PMBC proliferation *in vitro*, downregulating alloreactivity and proposing immunomodulation mechanisms. **Methods:** Responder PBMCs were labelled with CFSE dye, and stimulator cells irradiated. Co-cultured in a 2:1 ratio to mimic alloreactivity in MLR assays (n=3) for 6 days, with or without BM-MCs. MSC phenotype examined pre- and post-co-culture [2]. Flow cytometry examined PBMC proliferation through CFSE histograms and assessed surface marker expression of CD45+, CD3+, CD4+, CD8+, CD19+, CD56+ and CD14+. Resazurin assays tracked metabolic activity. CFSE immunofluorescence recorded PBMC proliferation, while phase-contrast images showed PBMC-MSC physical interactions. Data is shown as mean ± standard deviation. Statistical significance assessed with Two-Way ANOVA test (p<0.05). **Results:** BM-MSCs expanded successfully, maintaining ideal phenotype and function. CD44+ expression increased significantly in MSCs post-culture. CFSE expression aligned only with PBMC format, whilst phase-contrast images revealed closer alignment in co-culture. Metabolic activity showed enhanced metabolism in PBMCs/MSCs co-culture, with a 15% reduction in proliferating responder cells. March's pending immunophenotyping results will enhance understanding of the observed immunosuppression. **Conclusions:** Expanding BM-MSCs from discarded bags unravelled immunosuppression in alloreactive conditions. BM-MSCs, lacking CD44, had increased expression due to *in-vitro* cultivation [3]. Reduced alloreactive PBMC proliferation by 15% highlights MSCs' immunosuppressive potential. Upcoming immunophenotyping insights will detail the immunosuppression seen.

Keywords: Hematological Disease, Peripheral Blood Mononuclear Cells, Bone Marrow Derived-Mesenchymal Stem Cells, Immunomodulation, Flow Cytometry.

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21780 | Neuroprotective effects of cyanobacterial extracts

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Background & Aim: Neurodegenerative diseases (ND), namely Alzheimer's disease (AD) affects millions of people worldwide. Despite their high incidence there is still no effective medical therapy [1], [2]. Cyanobacteria have been in the frontline of the search for therapies for ND [3]. Several *in silico*, *in vitro*, and *in vivo* studies have provided support for the neuroprotective potential of cyanobacterial natural products, particularly in AD [4], [5]. In this context, the aim of this work was to screen cyanobacterial strains from the Blue Biotechnology and Ecotoxicology Culture Collection (LEGE-CC) for its anti-AD potential. **Methods:** 10 cyanobacterial strains (LEGE CC 06072, 06131, 06155, 06361, 07168, 07175, 07189, 11394, 11439, 16525) were cultivated and their dry biomass was extracted and fractionated by reverse-phase HPLC resulting in 8 fractions per strain [6]. Fractions were evaluated for their ability to inhibit enzymes associated with AD pathogenesis, such as acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE), using Ellman's colorimetric method. In addition, their cytotoxicity was assessed against three cell lines, two of them related to the nervous system. The neuroblastoma cell line SH-SY5Y, usually used as model for neurotoxicity studies and the human cerebral microvascular endothelial cell line hCMEC/D3, representative of the blood-brain barrier. The mouse fibroblast cell line 3T3-L1 was used as a representation of the conjunctive tissue. Cell viability was measured after 24 and 48 hours using the MTT assay. **Results:** The fractions did not shown cytotoxicity against the cell lines used. The preliminary results regarding enzyme inhibition were not promising, with less than 30% inhibition. **Conclusions:** Our preliminary suggest that further confirmation tests need to be performed on the AD related enzymes (AChE and BuChE), and the study should be extended to include other cyanobacterial strains.

Keywords: Cyanobacteria, Neurodegenerative Diseases, Acetylcholinesterase, Butyrylcholinesterase.

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21784 | Exploring the Relationship Between 24-Hour Urinary Sodium Excretion and Body Fat Mass Percentage in School-Aged Children: Insights from the ARIA Study

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Background & Aim: Childhood obesity is a complex public health problem responsible for a series of complications that contribute to increased morbidity and premature mortality. Increased sodium intake has been associated with obesity. Although some studies suggest a potential association, the evidence linking sodium intake to obesity, including body fat mass percentage (%), remains limited. Therefore, this study aims to verify whether there is an association between 24-hour urinary sodium excretion and body fat mass %, independent of total energy intake, in a sample of school-aged children from the ARIA 248-13 study. **Methods:** This cross-sectional analysis included 258 children aged between 7 and 12 years, enrolled in the 3rd and 4th year of 20 public schools across Porto, Portugal. Body fat mass % was assessed using Tanita™ BC-418 Segmental Body Analyzer. Children’s total energy intake was estimated on Food Processor® software through a single 24-Hour Recall Questionnaire, and to estimate urinary sodium was used the “gold standard”, 24-Hour urinary sodium excretion. The association between, our dependent variable, body fat mass % (>20.90%, median value), and our independent variable, 24-hour sodium excretion (>2507mg, median value), was estimated by binary logistic regression adjusted for sex, age, physical activity, total energy intake, and parental education. **Results:** There is a significant positive association between higher levels of sodium urinary excretion and higher values of body fat mass %, adjusted for previously referred confounders (aOR=2.26, IC95% 1.28-4.01). **Conclusions:** Our findings suggest that higher sodium intake is associated with a higher prevalence of body fat mass % among school-aged children, independent of total energy intake.

Keywords: Obesity, Children, Sodium, Energy Intake.

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21786 | Dissecting the roles of *PRUNE2* and *PCA3* in the *PRUNE2/PCA3/AR* triad and prostate cancer progression

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Background & Aim: Prostate cancer's (PrCa) global burden is quite substantial, ranking among the most frequent and lethal cancers worldwide. Family history of the disease is one of the most important risk factors for PrCa development [1], however, the genetic mechanisms underlying such increased susceptibility remain mostly elusive. To overcome this, our group recently entailed broader genome-wide approaches to identify new PrCa candidate genes and reported, for the first-time, pathogenic germline variants in the *PRUNE2* gene, leading to the proposal of this gene as a novel biomarker for PrCa predisposition [2]. *PRUNE2* dysregulation has been described in several tumour types, including prostate [3-5], where it is negatively regulated by *PCA3*, a long non-coding RNA that acts as an oncogene [6]. The interaction between *PCA3* and the androgen receptors (*AR*) has also been reported to affect cancer development [7], thus raising questions about *PRUNE2*'s involvement in the context of the *PRUNE2/PCA3/AR* triad and its response to drug treatment. **Methods:** This project aims to employ a multidisciplinary approach integrating computational transcriptomics using RNA-Seq, with siRNA-mediated protein depletion using two androgen-sensitive cell models (LNCaP and PNT1A) in order to determine the functions of *PRUNE2* and/or *PCA3*. In these models, microscopy-based assays will be used to assess cell proliferation, apoptosis and sensitivity to androgen receptor antagonists and agonists. **Results:** The preliminary results of the RNA-Seq analysis revealed 86 dysregulated genes in carriers of *PRUNE2* variants compared to noncarriers, and highlighted several alterations in cellular processes affecting the extracellular matrix (ECM) [Fig. 1]. **Conclusions:** This project is expected to consolidate *PRUNE2* as a novel PrCa predisposing gene, and as a potential predictive biomarker for therapy response, potentially opening new avenues for PrCa management strategies and/or targeted therapies.

Keywords: Prostate Cancer, *PRUNE2*, *PCA3*, RNA-Seq.

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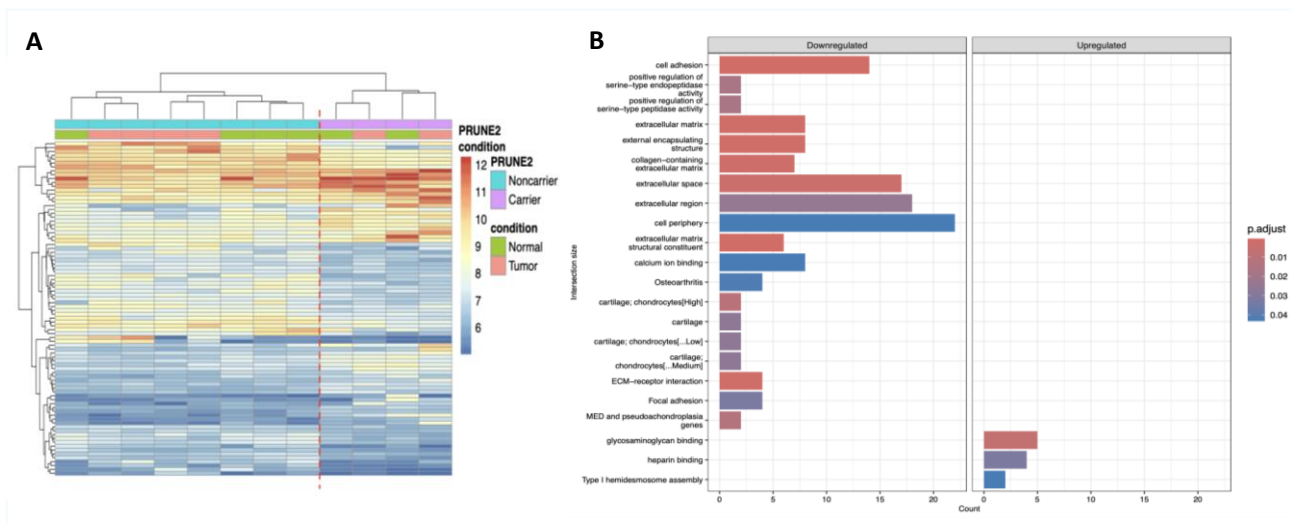


Figure 1: Preliminary results obtained via RNA-seq analysis of *PRUNE2* variant carriers. A) Heatmap with the 86 most dysregulated genes present in normal and tissue samples of six patients, two carriers and four noncarriers of *PRUNE2* variants. B) enriched pathways dysregulated by the up and downregulated genes.

21788 | Exploring the mechanisms of resistance in ovarian cancer: A metabolomic approach

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Background & Aim: High-grade serous carcinoma (HGSC) is the predominant subtype of ovarian cancer and poses significant challenges for therapeutic management. Current treatment protocols typically include cytoreductive surgery followed by a standardized regimen of paclitaxel (PTX) and carboplatin (CARB). This study aims to elucidate the metabolic basis of chemoresistance to PTX in HGSC using a metabolomics approach. By investigating the intracellular and extracellular metabolic dysregulation associated with PTX chemoresistance, we aim to improve our understanding of resistance mechanisms and potentially pave the way for more effective therapeutic strategies. **Methods:** Using a model of HGSC cells that initially exhibited inherent resistance to CARB (OVCAR 8 cell line), a PTX-resistant variant was subsequently developed that reflects real clinical scenarios [1]. The levels of intracellular and extracellular metabolites in PTX-resistant and wild-type cells were measured by gas chromatography-mass spectrometry (GC-MS) [2,3]. Statistical analysis of the GC-MS data included multivariate and univariate methods, with subsequent biological interpretation using pathway analysis. **Results:** Multivariate analysis revealed a clear separation between the intracellular metabolic profiles of PTX-resistant and wild-type cells. In particular, six metabolites - taurine, cysteine, myo-inositol, threonine, tyrosine and asparagine - were found to be significantly increased in the PTX-resistant cells. Regarding the extracellular metabolic profile it was not possible to discriminate between the two cell lines, as there were no changes in the levels of metabolites. Notably, the six metabolites identified spanned different pathways, including taurine and hypotaurine metabolism, glycine, serine and threonine metabolism.

Conclusions: These findings hold promise for improving therapeutic interventions by identifying key metabolites and pathways associated with paclitaxel resistance in ovarian cancer.

Keywords: Ovarian Cancer, Chemoresistance, Metabolomics, Gas Chromatography-Mass Spectrometry, Metabolic Pathways.

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21791 | Cardiac structural modifications in a shorter, refined rat diabetic model

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Background & Aim: *Diabetes mellitus* (DM) significantly impacts health, prompting translational studies¹. Prolonged rodent models (≥ 4 weeks) are often used to study cardiac complications of DM², so our aim was to assess if a shorter, refined streptozotocin (STZ)-induced DM protocol could induce similar cardiac alterations. **Methods:** After a 4-hour fast and analgesia with tramadol (20 mg/Kg, PO), 4 adult male *Wistar* rats received a single intraperitoneal injection of STZ (55mg/Kg). Four untreated rats were used as controls. All animals were monitored daily. After two weeks the animals were sacrificed, tibias were measured (used as a normalizer for body weight), and the right ventricle (RV) and the left ventricle plus septum (LV+ST) were weighed and processed for histological evaluation. Transverse sections were digitally photographed to blindly measure cardiomyocyte cross-sectional area. **Results:** Diabetic rats showed typical DM signs such as hyperglycemia (STZ:584.75 \pm 15.25mg/dL vs control:147.75 \pm 3.20mg/dL; $p < 0.05$), polydipsia, polyphagia, and weight loss. Morphometric analysis of the heart revealed that in STZ-induced animals there was an increase in the mass of the RV (STZ:0.04 \pm 0.01g/cm vs control:0.05 \pm 0.003g/cm; $p < 0.05$). However, in diabetic rats LV+ST weights were not statistically different from controls (STZ:0.17 \pm 0.01g/cm vs control:0.21 \pm 0.03g/cm; $p > 0.05$). The histopathological analyses of the heart sections from STZ-treated rats revealed hypertrophy of LV cardiomyocytes compared to controls (STZ:483.44 \pm 23.38 μm^2 vs controls:306.22 \pm 18.82 μm^2 ; $p < 0.05$), but not for the RV (STZ:368.17 \pm 26.26 μm^2 vs controls:333.70 \pm 15.86 μm^2 , $p > 0.05$). **Conclusions:** Our study shows that a 2-week STZ-induced DM protocol exhibits typical clinical signs and cardiac structural changes akin to longer protocols. Cardiomyocyte hypertrophy, characteristic of diabetic cardiomyopathy³, emerges within two weeks of DM induction, supporting the efficacy of a shorter, refined protocol for studying DM-related cardiac alterations.

Keywords: Diabetes Model, Animal Welfare, Heart, Diabetic Cardiomyopathy.

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21792 | Exploring the differentiation of AC16 cells: the quest for an ideal model of cardiomyocytes

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Background & Aim: Cardiovascular diseases present a significant challenge to global health. Despite advancements in the field, progress in developing new therapies and understanding the molecular and cellular mechanisms underlying heart diseases lags behind other areas. One of the obstacles is the difficulty in developing reliable *in vitro* human cell lines that accurately replicate the behaviour of adult cardiomyocytes. Additionally, ethical considerations regarding the use of human cells from available hearts add further complexity to this issue. The AC16 lineage of human cardiomyocytes shows promise in retaining morphological and functional characteristics of cardiomyocytes, although it is poorly characterized. Therefore, this project aims to analyse the AC16 lineage comprehensively, focusing on characterizing one of the differentiation process mentioned by Davidson *et al*¹. **Methods:** In this project, the AC16 cells were seeded in two 24 well plates at 32500 cells/cm² in proliferative medium (F-12 medium with 12.5% Foetal Bovine Serum) and left for 24h for adhesion. Morphological analysis started on the next day (T0) in the plaque of proliferative cells, whereas in the other plate, differentiation began, with the changing of the medium for differentiation medium (F-12 with 2% Horse Serum) for 24h (T0'). From this point onward, the morphology of cells in each group was evaluated through phase contrast microscopy for another 24-hs (T1 and T1'). **Results:** Preliminary data indicates that differentiation does not appear to induce significant changes in cell morphology at the earliest time-point, as morphology at T1 an T0' is similar. However, at T1', the cells that underwent differentiation are less elongated compared to proliferative cells. **Conclusions:** Our preliminary results show that differentiation causes morphological changes, but more tests are required, and the Hoechst nuclear staining along with the sulforhodamine B test will be implemented.

Keywords: Cardiac *In Vitro* Models, Cardiomyocyte Culture, Cardiac Physiology.

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21797 | Early-life exposure to non-nutritive sweeteners: effects on hepatic FGF21 pathways and mitochondrial function

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Background & Aim: To combat obesity, diets and food products containing non-nutritive sweeteners (NNS), which provide sweetness without caloric intake (1), have gained popularity, even among pregnant women who reported intentional NNS consumption during gestation (2). In 2023, the World Health Organization warned about NNS consumption, as their long-term effects may be associated with an increased risk of type 2 diabetes, cardiovascular diseases, and mortality. Importantly, the environment during early life can induce permanent changes in metabolic health in adult life (3), suggesting that fetal exposure to NNS may induce long-term metabolic dysfunction in offspring (2,4). Fibroblast growth factor 21 (FGF21) is a key regulator of metabolic homeostasis (5). So, this branch of the MHSWEET project aims to study the effects of Rebaudioside A (RebA, the major sweetener component of stevia) exposure during the perigestational period on hepatic lipid metabolism of adult offspring and the involvement of FGF21. **Methods:** Female Sprague-Dawley rats were administered RebA in the drinking water or water as control from 4 weeks before mating until weaning. Food and beverage consumption, morphometric parameters, fasting glucose, oral glucose tolerance, and insulin sensitivity were measured before sacrifice at 10 months of age. Functionality of G1 hepatic mitochondria (OROBOROS® Oxygraph-2k system), hepatic triglyceride levels (Oil-Red-O staining), genes involved in hepatic lipid metabolic pathways and inflammation (RT-PCR) will be evaluated. **Results:** The results obtained so far, showed that RebA exposure increased body weight in adult female offspring and induced dysglycemia in adult male offspring. The remaining studies are still being conducted. **Conclusion:** Results seem to support the hypothesis that intrauterine exposure to RebA may program offspring to a dysmetabolic state. These results will be useful to improve knowledge, and support public health policies regarding NNS use throughout life.

Keywords: Non-Nutritive Sweeteners, Rebaudioside A, Fetal Programming, Metabolic Dysfunction, FGF21.

Acknowledgments

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21803 | Comparative Neurotoxicity Assessment of Four Structurally Similar Synthetic Cathinones Using a Cholinergic Neuronal Model

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Background & Aim: Synthetic cathinones are potent central nervous system (CNS) stimulants that induce diverse neurological and psychiatric effects such as delusions and agitation. This fast-expanding class of new psychoactive substances (NPS) represented the majority of those seized in the European Union in 2021. Despite the growing interest, the knowledge of their neurotoxicity mechanisms, namely during neuronal differentiation, remains limited. Thus, we herein aimed to compare the neurotoxicity of four structurally-related synthetic cathinones (3-CMC, 4-CMC, 4-CEC, and Ethcathinone), differing in the presence and position of a chlorine in the aromatic ring and in the length of the *N*-alkyl group, in a well-characterized neurogenesis model. **Methods:** Lysosomal integrity, analyzed by the neutral red uptake assay, and reactive oxygen/nitrogen species (ROS/RNS) production, evaluated with the DCFH-DA probe, were assessed in NG108-15 neuroblastoma x glioma cells differentiated in a cholinergic phenotype [induced by serum-starved medium (1% FBS) supplemented with forskolin and retinoic acid], following a 24 h exposure to the tested drugs (0-1 mM). **Results:** All synthetic cathinones significantly reduced lysosomal integrity and increased ROS/RNS formation, particularly evident for concentrations ≥ 100 μM . Notably, the cathinones with a chlorine in the fourth position of the aromatic ring exhibited more pronounced effects, causing cell viability loss at 100 μM , while for the others it was only significant for concentrations higher than 500 μM . Moreover, structures with a longer *N*-alkyl substituent appeared to show higher cytotoxicity. **Conclusions:** The positioning of the halogen within the aromatic ring influenced the cytotoxicity of synthetic cathinones, being seemingly associated with increased oxidative stress. Future research should encompass mechanistic studies, particularly focusing on specific neurogenesis-related processes, to comprehensively unravel the underlying neurotoxicity mechanisms.

Keywords: Synthetic Cathinones, Neurotoxicity, NG108-15 Cells, Cytotoxicity, ROS Production.

Acknowledgments

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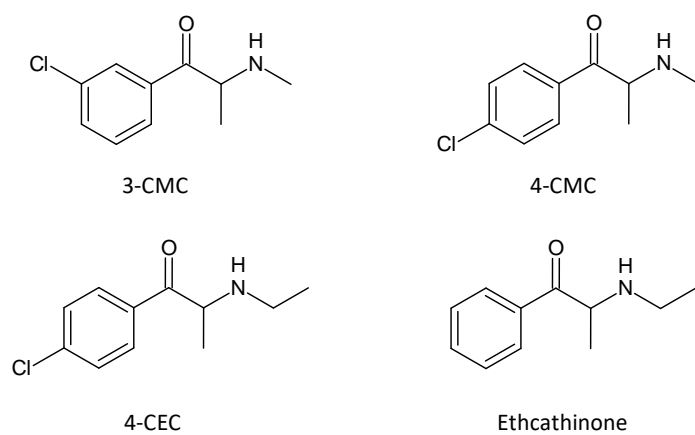


Figure 1: Chemical structures of 3-chloromethcathinone (3-CMC), 4-chloromethcathinone (4-CMC), 4-chloroethcathinone (4-CEC), and ethcathinone.

21822 | Incidence of and mortality by tuberculosis around the world: Risk factors

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Background & Aim: Tuberculosis (TB) is a public health problem in developing countries, with determinants associated to environmental, wealth and health services factors. We aimed to identify factors associated with the incidence and mortality of TB across the world. **Methods:** Cross-sectional study using TB incidence and mortality by TB obtained from the World Health Organization (WHO) and The World Bank, respectively. 31 other independent variables were obtained accessing data from countries publicly available data from 11 sources (World Health Organization, World Bank, International Diabetes Federation, United Nations, Global Hunger Index, World Population Review, International Labour Organization, Institute for Health Metrics and Evaluation, and Our Word in Data). Bivariate correlation analyses were conducted between the two main outcomes and each covariate. Also, different linear regression models were also tested. **Results:** The highest TB incidence rates per 100,000 population were found in Lesotho (650), South Africa (554), and Central African Republic (540). A significant correlation with TB incidence was found for 23 variables, having life expectancy at birth ($R=-0.620$) and the Human Development Index – HDI ($R=-0.518$) the two strongest associations. Correlation with mortality by TB existed for 23 variables, being life expectancy at birth ($R=-0.629$), HDI ($R=-0.526$), and number of physicians per 10,000 inhabitants ($R=-0.508$). In the multivariate models using variables with higher association statistics, a high collinearity was found between life expectancy at birth and nutrition rate. In the models that included the HDI, this was the only covariate presenting association with TB incidence. When excluding HDI in the models, the strongest association appeared for the number of incident cases of HIV per 1,000 non-infected people. **Conclusions:** Variables related to health services status and wealth, but not with climate, presented the strongest predictive association with TB incidence and mortality.

Keywords: Tuberculosis, Incidence, Risk Factors.

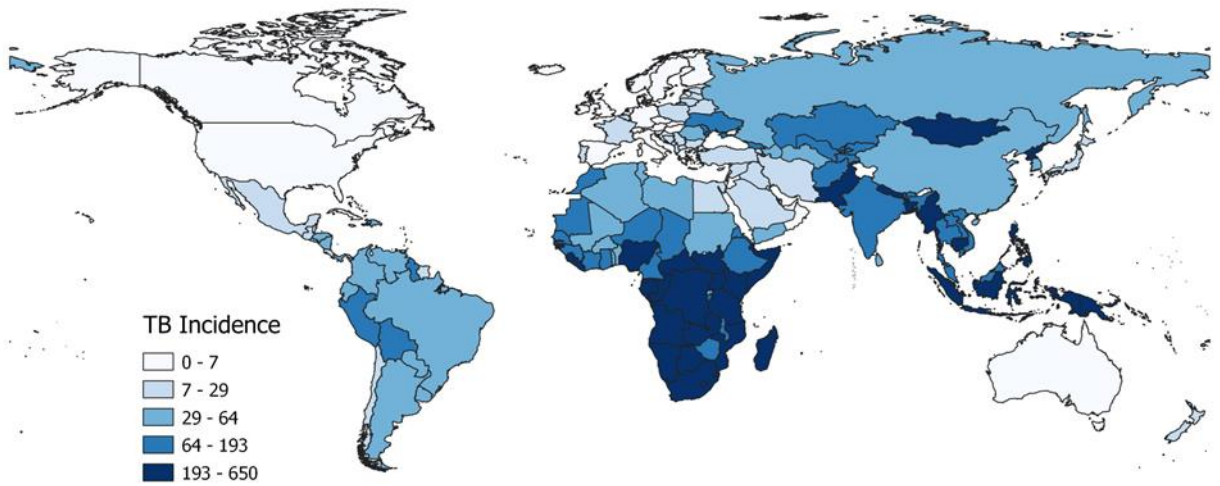


Figure 1: Global distribution of the incidence of tuberculosis in 2023.

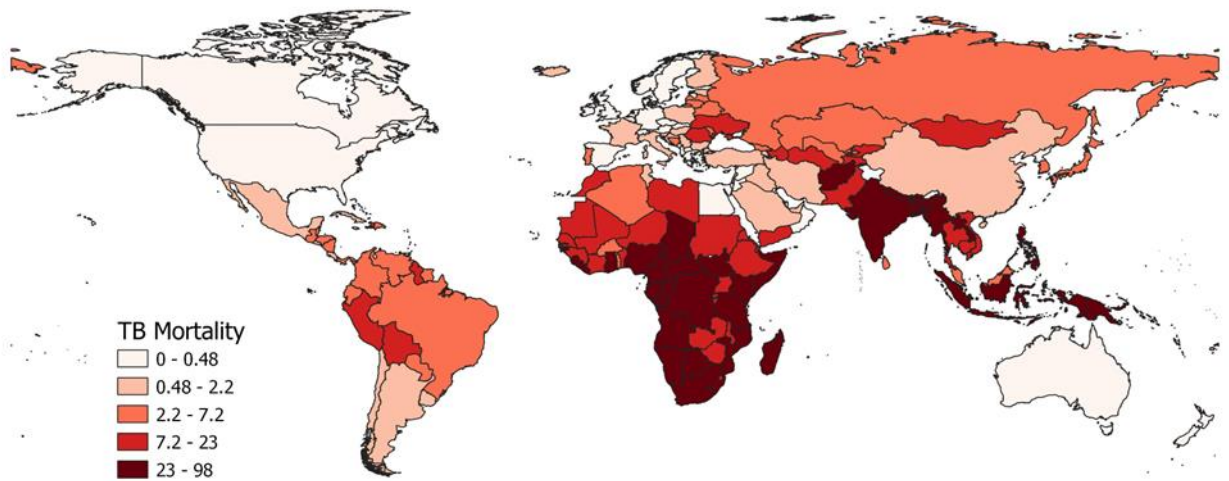


Figure 2: Global distribution of the mortality of tuberculosis in 2023.

21828 | Exploring TTR stabilization as treatment for Alzheimer's Disease

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Background & Aims: Alzheimer's disease (AD) is a neurodegenerative disorder characterized by the aggregation of amyloid- β peptide ($A\beta$), mainly the two predominant forms, $A\beta_{40}$ and $A\beta_{42}$. $A\beta$ peptides form oligomers, that then evolve into amyloid fibrils that deposit extracellularly forming the senile plaques, characteristic of AD. Several studies have shown Transthyretin (TTR) as a neuroprotective protein, decreasing $A\beta$ aggregates and potentially promoting its elimination. However, TTR is decreased in AD patients. It has been hypothesized that TTR is unstable in AD, leading to accelerated clearance, explaining its decreased levels. TTR has a natural ligand, thyroxine (T4), responsible for stabilizing the tetrameric structure of the protein. IDIF (Iododiflunisal) is a molecule with a structure similar to T4, and a strong TTR stabilizer, and might help decrease $A\beta$ aggregates. This study aimed to explore the therapeutic potential of IDIF through TTR stabilization, in AD transgenic mice, 5XFAD. Animals were evaluated longitudinally by PET for amyloid deposition, from 2 to 9 months. **Methods:** At the end of the treatment, the transgenic 5xFAD mice receiving oral treatment of IDIF (0, 10, 30, 100, 300 mg/Kg/day) were euthanized and half of their brain was used to immunohistochemical analysis to measure brain $A\beta_{42}$ amyloid burden. The other half was homogenized to perform ELISAs to measure total brain levels of $A\beta_{40}$ and $A\beta_{42}$. **Results:** Immunohistochemistry for $A\beta_{42}$ revealed that treatment with IDIF at 100 mg/Kg/day increased plaque load in the cortex, while ELISA analyses revealed no significant variations in $A\beta_{40}$ and $A\beta_{42}$ levels in total brain, compared to control animals. **Conclusions:** Treatment with IDIF did not prevent or reduced $A\beta$ aggregation and deposition, as analysed at 9 months. The increased amyloid burden, particularly with the dose of 100 mg/Kg/day, may underly a protective mechanism to decrease the oligomeric peptide. New studies should be performed to evaluate the effect of IDIF at early ages.

Keywords: $A\beta$ eta, Senile Plaques, Transthyretin Stabilization, Iododiflunisal.

21831 | Rare origin of the sinoatrial node artery: an anatomical case report

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Background & Aim: The sinoatrial node functions as the pacemaker of the heart [1], and is irrigated by the sinoatrial node artery (SANA), whose origin, number, size, and course are reported to be variable [2,3]. The aim of this study is to describe a rare variation in the SANA origin. **Methods:** The thoracic cavity of a formalin-embalmed adult male cadaver was dissected at the Unit of Anatomy, Department of Biomedicine, Faculty of Medicine, University of Porto. As per routine, appropriate dissection techniques were performed by using proper dissection tools in order to achieve the teaching and research objectives of human cadaveric dissection [1,4]. During the dissection, several morphological measurements were taken. The vessels were also characterized radiologically through X-ray and magnetic resonance imaging. **Results:** The SANA originates from a long atrial branch of the right coronary artery (RCA) that starts at the level of the inferior border of the heart. The SANA runs to the sinoatrial node anteriorly to the superior vena cava. The length of the RCA from its origin in the ascending aorta to the origin of the atrial branch was 71.23 mm. The length of this atrial branch from its origin to the site where it perforates the myocardium was 100.14 mm, and from this point until the origin of the SANA it was 1.89 mm. The length of the SANA from its origin to the site where it perforates sinoatrial node was 32.35 mm. The diameter of the atrial branch at its origin, where it enters the myocardium and where it originates to the SANA was 2.35 mm, 1.90 mm and 1.65 mm, respectively. The diameter of SANA at its origin was 1.10 mm. The angle of origin of the atrial branch from RCA was 95°, and the angle origin of the SANA from its parent trunk was 120°. **Conclusions:** The knowledge of the anatomical variations of the SANA is of the utmost importance for cardiologists and heart surgeons to better understand cardiac disease and accurately plan and execute cardiac interventions and surgical procedures.

Keywords: Anatomy, Anatomical Variations, Clinical Relevance, Human Cadaveric Dissection, Sinoatrial Node Artery.

Acknowledgments

The authors sincerely thank those who donated their bodies to science so that anatomical research could be performed. Results from such research can potentially increase mankind's overall knowledge and contribute to the improvement of patient care. Therefore, these donors and their families deserve our highest gratitude. We would also like to thank Doctor Catarina Silva, Director of the Radiology Department, Centro Hospitalar Universitário São João, Porto, for the access to the Department's facilities, and the excellent technical assistance of the staff of this Department, namely Paula Cardoso, Leila Pereira and Vitor Silva is also gratefully acknowledged.

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Figure 1: Anterior views of the heart and juxtacardiac parts of its great vessels. The pericardium has been partially retracted (a, b). (a) The cardiac and vascular dissected structures are in their proper positions. (b) The ascending aorta was retracted medially, and the right atrium and right auricle were retracted laterally in order to observe the course of the atrial branch of the RCA until it perforates the myocardium. Arrows indicate the course of the RCA and arrowheads indicate the course of its atrial branch. Indication of cardiac chambers and great vessels: 1, right atrium; 2, right auricle; 3, right ventricle; 4, ascending aorta; 5, superior vena cava.

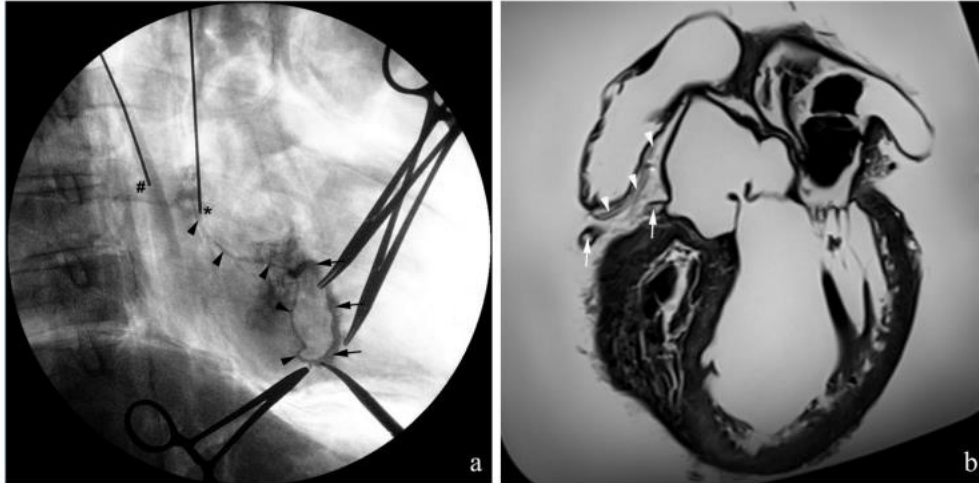


Figure 2: (a) Fluoroscopic imaging of a postmortem angiography showing the course of the RCA and its atrial branch (right anterior oblique view). The black arrows indicate the RCA and the black arrowheads the atrial branch of the RCA. The tip of the probe marked with # indicates the most inferolateral point of the superior vena cava (indication of the area of location of the sinoatrial node), and the tip of the probe marked with * indicates the point where the atrial branch of the RCA perforated the myocardium. (b) Magnetic resonance imaging (from T2 weighted sequences) showing part of the course of the RCA and its atrial branch. The white arrows indicate the RCA and the white arrowheads the atrial branch of the RCA.

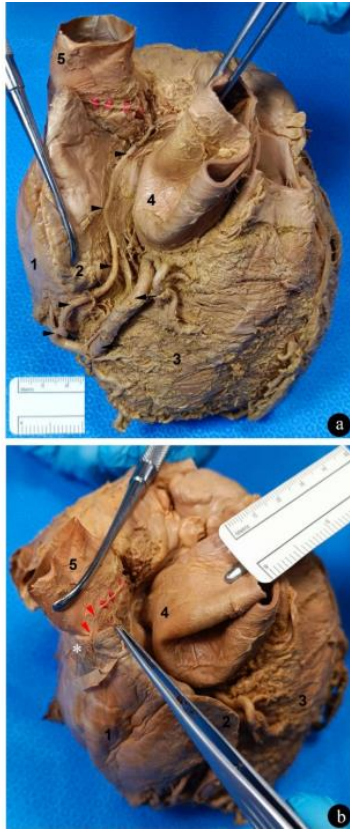


Figure 3: Views of the isolated heart and the juxtacardiac parts of its great vessels. (a) The ascending aorta was retracted to the left and the right atrium and the right auricle to the right in order to observe the course of the atrial branch of the RCA and the SANa. The black arrows indicate the RCA, the black arrowheads indicate the atrial branch of the RCA and the red rectangles mark the SANa. (b) Zoomed view of the SANa (red rectangles and red arrowheads) and the sinoatrial node (white *). Indication of cardiac chambers and great vessels: 1, right atrium; 2, right auricle; 3, right ventricle; 4, ascending aorta; 5, superior vena cava

21833 | The influence of exposure approaches in an *in vitro* model of the human lung barrier for toxicity testing

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Background & Aim: The distal lung's epithelial tissues are continuously exposed to inhaled air, making them of interest to study respiratory exposure to both hazardous and therapeutic materials [1]. Many pulmonary *in vitro* studies have used cell lines under submerged conditions, which do not accurately reflect the pulmonary physiology. *In vitro* models cultured at air-liquid interface (ALI) are a physiologically more relevant alternative for lung toxicity testing [2]. We are developing an advanced co-culture model to simulate the lung-blood barrier using type I (hAELVi) and type II (A549) alveolar cells and endothelial (EA.hy926) cells. In this model, we are testing possible exposure conditions to mimic the *in vivo* exposure. **Methods:** Triple cultures of the different cell types were seeded on 0.4 μm -pore inserts and 2 days later ALI was induced. On days 2, 7, 14 and 21 in ALI, cultures were characterized by measuring: transepithelial electrical resistance (TEER; STX2 chopstick electrode EVOM2); permeability, checking the paracellular transport of Lucifer Yellow; cellular metabolism, following resazurin reduction; cell viability imaging (LIVE/DEADTM) and LDH release. The *quasi*-ALI (qALI) condition was initiated when cultures reached a TEER of $>300 \Omega \cdot \text{cm}^2$ [3]. **Results:** The qALI condition resulted in higher TEER values compared to the other conditions, followed by a decrease in permeability. Throughout time in culture, cellular metabolism decreased, however microscopic inspection and imaging suggested good cellular health and the LDH release assay confirmed that viability didn't seem too compromised. **Conclusions:** The qALI condition resulted in improved barrier function relative to the other conditions, without a major loss of cell viability. ALI and qALI are the most promising conditions for, respectively, culturing and exposing advanced *in vitro* models of the human lung.

Keywords: Lung Barrier, Exposure, Submerged, ALI, *Quasi*-ALI.

Acknowledgements

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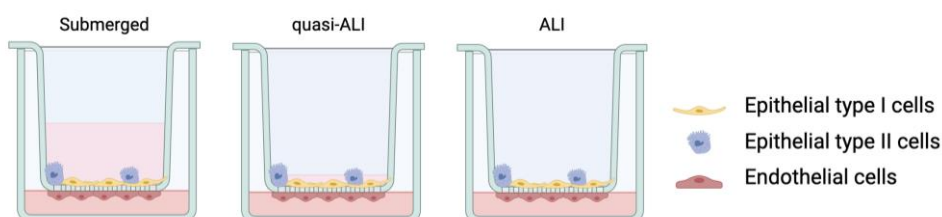


Figure 1: Schematic representation of the different conditions tested: submerged, ALI (air-liquid interface) and *quasi*-ALI.

21834 | Prevalence of pulmonary hypertension on echocardiogram in dogs with brachycephalic syndrome

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Background & Aim: Pulmonary hypertension (PH) is a common but often overlooked condition in dogs. In brachycephalic breeds is particularly evident due to inherent anatomical alterations in their upper and lower airways [1]. Diagnosis is typically challenging and expensive, often requiring echocardiography [2]. Our study aimed to determine the prevalence of PH detected through echocardiography in brachycephalic dogs with brachycephalic obstructive airway syndrome (BOAS) and to compare the severity of clinical signs with echocardiographic findings. **Methods:** The study sample consisted of 10 brachycephalic dogs. Functional classification of clinical signs was conducted along with airway analysis both at rest and following exercise tolerance testing. Multiple echocardiographic measurements were performed to assess the probability of PH. **Results:** Approximately 40% of the dogs exhibited grade 1 severity of BOAS clinical signs, while 50% exhibited grade 2, and 10% grade 3. Echocardiographic assessments revealed that 60% of the animals exhibited an intermediate probability of PH, with 30% showing a high probability, and 10% a low probability. Among animals classified with grade 1 BOAS, 75% exhibited an intermediate echocardiographic probability of PH, while 25% exhibited a high echocardiographic probability. Among those classified with grade 2 BOAS, 60% displayed an intermediate probability of PH, 20% a low probability, and 20% a high probability. **Conclusions:** Brachycephalic breeds demonstrate significant anatomical alterations in both the upper and lower respiratory systems. These changes not only impact respiratory function but may also influence the cardiac system. The data presented here indicate a significant prevalence of PH in brachycephalic breed dogs; however, to further support these findings, it is recommended to conduct a broader study with a more representative sample size to consolidate the current conclusions.

Keywords: Brachycephalic Dogs, Pulmonary Hypertension, Prevalence.

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21835 | Deciphering horizontal transmission of resistance in lung cancer: The role of caveolae-dependent endocytosis

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Background & Aim: Patients with advanced lung adenocarcinoma that harbor mutations in the *epidermal growth factor receptor (EGFR)* gene can be treated with EGFR-tyrosine kinase inhibitors (EGFR-TKIs), such as erlotinib (1). Nevertheless, tumours eventually acquire resistance to EGFR-TKIs, usually due to the p.T790M mutation (2). Previous results from our research group indicate, however, that a large proportion of erlotinib-resistant cells do not carry this mutation (3). This suggests that the acquisition of resistance occurs through a mutation-independent mechanism, possibly via secreted or extracellular vesicles encapsulated molecules that can alter the phenotype of recipient cells to a resistant one. We designated this event horizontal transmission of resistance. Furthermore, we observed that the resistance phenotype acquired by the cells is a stable characteristic that does not result from mutations (3), suggesting that epigenetic modifications may play a role in perpetuating this phenotype. Therefore, the aim of the project is to compare if there are differences in the DNA methylation of erlotinib-sensitive cells and cells that exhibit the erlotinib-resistant phenotype. **Methods:** DNA extracted from erlotinib-sensitive HCC827 cells and HCC827 cells that exhibit the erlotinib-resistant phenotype will be analyzed using a DNA methylation array. **Results:** Preliminary results demonstrate that erlotinib-sensitive HCC827 cells acquire resistance to erlotinib faster when supplemented with conditioned media from erlotinib-resistant H1975 cells. In addition, when this supplementation is discontinued and the cells are treated with erlotinib, the resistance phenotype is maintained. This was validated *in vivo* by transplanting the tumour that exhibited the resistance phenotype to new mice (3). **Conclusions:** This project demonstrates that the acquisition of resistance to EGFR-TKI therapy does not occur solely by vertical transmission, but also through our proposed model of horizontal transmission of resistance.

Keywords: Lung Adenocarcinoma, EGFR, Erlotinib, Resistance, DNA Methylation.

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21849 | Assessment of antimicrobial resistance in Gram-negative bacteria from rivers supplying drinking water: insights for water quality management

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Background & Aim: Antimicrobial resistance-AMR threatens human-animal-environmental health and its presence in surface water system demands careful studies. Here we assessed the spread of AMR Gram-negative bacteria used in analysis of rivers supplying drinking water. **Methods:** Seventy-six samples (42-water/34-sediments; 6-rivers:A-F) were collected in Porto region (22-Winter/29-Spring/25-Summer). Standard methods were used for *Escherichia coli*-Ec+coliform counts and *Salmonella* detection. Ec phylogenetic groups-PhG and *Salmonella* serotypes were identified by PCR+WGS, susceptibility to antibiotics/biocides by disk diffusion or broth-microdilution (EUCAST/CLSI), antibiotic (*bla*_{ESBL})/metal tolerance-MeT genes (*copper-pcoD/silA/silE*; mercury-*merA*; arsenic-*arsB*) by PCR, and metals by ICP-MS. **Results:** Most samples had Ec (91%:2-13,000 CFU/100ml) and coliforms (100%:42-256,000 CFU/100ml), all below advisable values. *Salmonella* (n=60; diverse serotypes) was found in 20% of samples, varying among rivers (0-43%;p<0.05-Fisher), but not seasons (p>0.05). Rivers with *Salmonella* had Ec or *K.pneumoniae* producing extended-spectrum-beta-lactamases-ESBL. Multidrug-resistant-MDR Ec (33/133 isolates; diverse PhG) were similar in all samples (40-60%;p>0.05). Resistance to ampicillin (29-50%), aminoglycosides (17-60%), cephalosporins (0-33%), ciprofloxacin (0-40%), chloramphenicol (0-29%), sulphonamides (8-29%), tetracycline (0-50%), and trimethoprim (10-50%) were similar (p>0.05) among rivers. MeT genes were found in few *Salmonella*+Ec samples (*sil±pco*:0-40%;*merA*:0-50%), supporting low metal concentrations found in water (Cu:0.27-1.94µg/L; As:0.78-15.6 µg/L; Hg:<0.048µg/L). Different species had BZC MIC/MBC ≤32mg/L (wild-type). **Conclusions:** This study shows the widespread of MDR bacteria, including *Salmonella* serotypes with clinical relevance and ESBL-producing Enterobacterales, in

rivers used for drinking water production, stressing the need for a robust water quality management.

Keywords: Water quality; Antimicrobial Resistance; Surface waters; Environment; Public health.

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21858 | A novel phenotype of Invariant Natural Killer T cells present in α -Galactosidase knockout mice

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Background & Aim: Fabry Disease is a rare genetic lysosomal storage disease caused by mutations in the GLA gene, that encodes the enzyme α -Galactosidase (α -Gal) responsible for catalyzing globotriaosylceramide (Gb3). In young α -Gal knockout (KO) mice there is accumulation of Gb3 and Invariant natural killer T (iNKT) cells are reduced in spleen, thymus and liver. iNKT cells are lipid reactive, CD1d-restricted T cells, expressing semi-invariant TCR. This work aims to characterize iNKT cells in α -Gal KO mice, in the already mentioned organs and extend this analysis to lymph nodes (LN) and blood. **Methods:** Herein, α -Gal KO mice and control wild type (WT) littermates with B6.129 background aged between 10-12 months were used. Blood, inguinal LN, spleen, liver and thymus were retrieved, processed, stained and the cells characterized through flow cytometry equipped with spectral technology (Cytek Aurora). **Results:** When comparing α -Gal KO and WT mice there is a tendency for lower iNKT cell frequency in α -Gal KO mice in all organs except thymus. We also found decreased CD4+ iNKT cells in Fabry mice's liver and spleen compared to WT mice. This tendency was also seen in the thymus and blood of α -Gal KO. In mice, iNKT cells are characterized as either CD4+ or double negative (DN) for both CD4 and CD8, typically not expressing CD8. Our results in aged mice show a surprising population of CD8+ iNKT cells in the peripheral organs of all animals analyzed regardless of the mice's genotype (WT/ α -Gal KO) (LN: 48% \pm 14/ 35% \pm 15; blood: 79% \pm 24/ 84% \pm 4; spleen: 8% \pm 5/ 18% \pm 10; liver: 51% \pm 16/ 65% \pm 14; thymus: 2% \pm 2/ 2% \pm 1). Furthermore, these CD8+ iNKT cells were found to be predominantly CD8 $\alpha\beta$ with a variable TCR V β chain. **Conclusions:** Altogether, our results show a surprising CD8+ iNKT cell population in both mice and that iNKT cells are decreased and altered in α -Gal KO mice. Ongoing experiments are being carried out to further understand the biology of mice CD8+ iNKT cells and explore differences between α -Gal KO and WT mice.

Keywords: iNKT cells, Fabry disease, CD8 expression

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21862 | Synthesis, acetylcholinesterase inhibition and antioxidant activity of a series of xanthenes

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Background & Aim: Alzheimer's disease is an age-related dementia associated with a progressive loss of mental function, characterized by the degeneration of brain tissue, particularly cholinergic neurons. Therefore, one of the therapeutic strategies for this pathology consists of searching for drugs that increase acetylcholine (ACh) levels in the brain, including direct inhibitors of the enzyme responsible for its degradation, acetylcholinesterase (AChE) [1]. A class of compounds with a wide range of biological activities, including anti-Alzheimer, are the xanthenes [2]. Previous studies revealed that promising anti-Alzheimer's xanthenes also showed antioxidant activity [3]. The aim of this work is to synthesize and evaluate the biological activity of promising xanthenes as potential agents for Alzheimer's disease. **Methods:** Xanthenes were synthesized using different methodologies [4]: conventional reflux reaction, microwave assisted reaction and using a muffle furnace. AChE activity was assessed by a qualitative Ellman method that uses an alumina plate as a support [5]. A quantitative DPPH radical scavenging assay was carried out to predict the potential antioxidant activity of synthesized compounds [2]. **Results:** The synthesis of all xanthenes were successfully performed. In the AChE activity assay, three xanthenes (including 3,4-dihydroxyxanthone) demonstrated ability to inhibit this enzyme considering the observation of white halos on the alumina plate at the site of application of the xanthenes against a background yellow. In the antioxidant activity assay, 3,4-dihydroxyxanthone revealed to be the most potent DPPH scavenger showing an EC₅₀ value of 17.46 μM. **Conclusions:** The 3,4-dihydroxyxanthone demonstrated to be the most promising compound for both activities, suggesting its potential as a dual agent for Alzheimer's disease.

Keywords: Alzheimer; Xanthone; Synthesis; Acetylcholinesterase Inhibition; Antioxidant Activity.

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21865 | Dopaminergic orbitofrontal cortex modulation of spatiotemporal gratification and impulsivity in rats with inflammatory pain

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Background & Aim: Pain-related hypodopaminergic signaling in the orbitofrontal cortex (OFC) results in an impairment of spatiotemporal reward associations in goal-directed behaviors. However, the neural mechanisms that determine this impairment are poorly understood. To address this issue, we evaluated (1) the impact of a long-term persistent monoarthritic inflammatory pain condition (CFA), and (2) dopamine D2 receptor activity (D2r) modulation during the performance of a delayed gratification task (DGt). **Methods:** The DGt consisted of 2 retractable levers with different reward deliver contingencies: the instant lever (delivering 1 food-pellet if pressed 5 sec after exposure), and the delayed lever (delivering 3 food-pellets if pressed 10 sec after exposure). Prior to induction of inflammatory pain, rats subjected to unilateral lesions of the OFC using quinolinic acid (0.4 μ l, 0.18 M). Behavior performance was assessed 1, 2, and 3 weeks post-CFA injection. Each probe session comprises 3 independent treatments: vehicle (NaCl 0.9% w/v, IP), raclopride (antagonist D2r, 0.05 mg/kg, IP), and quinpirole (agonist D2/3r, 0.05 mg/kg, IP). Mechanical noxious stimulation was assessed using von Frey filaments. **Results:** Our findings indicate that peripheral inflammatory caused a disruption in DGt performance. Preliminary results suggest that CFA-treated rats exhibit a greater inclination toward making instant choices over delayed ones. The systemic administration of D2r neuromodulators successfully reversed the behavioral phenotype differences observed between Sham- and CFA-treated rats. **Conclusions:** Collectively, these preliminary results suggest that the disruption of dopaminergic balance may play a crucial role in the development of cognitive impairments experienced during painful conditions.

Keywords: Inflammatory Pain; Dopaminergic Modulation; Orbitofrontal Cortex; Impulsivity.

21877 | A dive into diversity and antimicrobial resistance of *Enterococcus* from rivers used for drinking water production

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Background & Aim: Antimicrobials affect microbial diversity and the spread of antimicrobial-resistance (AMR) in surface waters. Here we studied the occurrence and diversity of antimicrobial-resistant *Enterococcus*, a water quality indicator, in rivers used for drinking water production. **Methods:** Water (n=42) and sediments (n=34) samples were collected (n=6 rivers-A-F; Porto region; 10 months/2022-2023) and *Enterococcus* recovered by standard water quality protocols. Species were studied by PCR, antimicrobial (antibiotics/biocides) susceptibility by disk diffusion/broth-microdilution (EUCAST/CLSI, 2023), linezolid resistant (*optrA/poxA*) or metal tolerance (copper-*tcrB/cueO*; arsenic-*arsA*; mercury-*merA*) genes by PCR and metals by ICP-MS. **Results:** *Enterococcus* were in 89% of the samples (2-6000CFU/100ml), below the maximum advised values for surface waters supporting chemical+physical+disinfection treatment. Isolates (n=208) belong to 9 species. The clinical-relevant *E.faecium* (*Efm*) and *E.faecalis* were less detected than other species (2-5%, 17-36% or 83-100% of samples, respectively). Resistance to chloramphenicol, linezolid, gentamicin, ciprofloxacin (0-17%, each), quinupristin-dafopristin (0-33%), streptomycin (7-25%), erythromycin (21-50%) or tetracycline (42-50%) was similar (p>0,05; Fisher) among rivers. Linezolid-resistance (MIC=8-16mg/L) was found in *Efm* (*optrA+poxA*), *E. gallinarum* or *E.durans* (*optrA*) from two rivers. Benzalkonium-chloride MIC/MBC values were of wild-type strains (0.5-4mg/L; n=62). Few samples carried *tcrB±cueO* (8-33%/river; including the linezolid-resistant-*Efm*), *arsA_I* (17%/river-C) or *merA_IV* (0-17%/river), supporting low concentrations of metals found in water (copper:0.27-1.94µg/L; arsenic: 0.78-15.6 µg/L; mercury: <0.048µg/L). **Conclusions:** The year-round presence of MDR-*Enterococcus*

emphasizes the role of surface waters in spreading AMR. Of concern are MDR+linezolid-resistant+copper-tolerant isolates occurring in samples with an *Enterococcus* load below the advised legal limits if treatment barriers prove ineffective.

Keywords: Water Quality Indicators, *Enterococcus*, Antimicrobial Resistance, Surface Waters, Environment, Public Health.

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21880 | Association between dietary patterns and activity of angiotensin-converting enzymes in human feces

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Background & Aim: Angiotensin-converting enzyme (ACE) and ACE2 are crucial components of the renin-angiotensin system, a major regulator of blood pressure. Considering that diet strongly impacts blood pressure and intestinal microbiota, we aimed to measure the fecal activity of ACE and ACE2 in omnivorous (OMNI) and vegan (VEG) individuals, and to look for an association with blood pressure levels. **Methods:** This study is a sub-project of VeggieNutri (n=425), a cross-sectional study (ClinicalTrials #NCT05408962) of healthy adults following different dietary patterns for at least 1 year and living in Portugal. VeggieNutri was approved by the Ethics Committee of the FMUP (#23/CEFMUP/21). OMNI (n=12) and VEG (n=14) systolic (SBP) and diastolic blood pressure (DBP) were measured at FMUP; fecal samples were collected and sent to FFUP by participants within 2 days. Fecal ACE and ACE2 activities were quantified by fluorimetric assays, and fecal calprotectin was quantified as a marker of intestinal inflammation. Statistical analysis was performed in GraphPad Prism. Mann-Whitney test or unpaired Student t test were used to compare groups, and Spearman correlation to evaluate the association between variables. Results are presented as median [Interquartile range] or mean \pm SD. $p < 0.05$ was considered statistically significant. **Results:** ACE and ACE2 activity, as well as SBP and DBP, were similar between OMNI and VEG individuals. ACE activity was negatively correlated with DBP when all participants were considered ($r = -0.444$, $p < 0.05$) and in the OMNI group ($r = -0.641$, $p < 0.05$) but not in the VEG group ($r = -0.502$, $p > 0.05$). ACE2 activity was negatively correlated with SBP in the VEG group ($r = -0.550$, $p < 0.05$) but not in the OMNI group ($r = 0.084$, $p > 0.05$) or when all the participants were considered ($r = -0.247$, $p > 0.05$). Fecal calprotectin levels were similar between groups. **Conclusions:** Blood pressure seems to be associated with the activity of fecal ACE and ACE2 depending on the dietary pattern.

Keywords: Angiotensin-Converting Enzyme, Angiotensin-Converting Enzyme 2, Activity, Feces, Diet

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21898 | Development of active targeting strategies for the delivery of lipid-based nanoparticles to macrophages

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Background & Aim: Epigallocatechin Gallate (EGCG) is the main catechin present in green tea. It presents a wide range of benefits such as its powerful antioxidant and anti-inflammatory properties. However, there are many challenges associated with its oral administration and bioavailability, and it exhibits low permeability across the gastrointestinal tract barrier, due to its polyhydroxy structure [1]. These difficulties in the use of EGCG highlight the need for the development of more effective methods for its administration and consequent delivery to target cells. In this work, Solid Lipid Nanoparticles (SLN) and Nanostructured Lipid Carriers (NLC) were screened as delivery devices of EGCG to macrophages to manage inflammation. **Methods:** Parameters such as size, loading capacity and encapsulation efficiency were assessed and a functionalization with D-Mannose was performed, due to the MR/CD206 receptor present in the macrophages' membrane. Dialysis and hemolysis assays were performed to evaluate release of EGCG and hemocompatibility of nanoparticles, respectively, as well as a Trolox equivalent antioxidant capacity (TEAC) assay to assess antioxidant activity. **Results:** The results demonstrated that the NLCs were best suited to be internalized by macrophages. During the dialysis assay, the particles released EGCG at a steady rate in physiological conditions and the hemolysis assay revealed they were safe for intravenous administration. The TEAC assay revealed that the encapsulated EGCG maintained its antioxidant capacity and was able to sequester free radicals in the surrounding environment. **Conclusions:** The results show the promising capabilities of these nanoparticles to serve as a delivery system for EGCG to manage inflammation, as it was observed that the drug maintained its beneficial effects all while being protected from the exterior environment that would lead to its degradation. This strategy can contribute to solving the difficulties associated with the use of EGCG as a therapy.

Keywords: Epigallocatechin Gallate, Nanostructured Lipid Carriers, Macrophages, Antioxidants.

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21902 | Development of a method for forensic toxicological analysis using bone as an alternative matrix

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Background & Aim: In the forensic investigation of corpses at late stages of putrefaction, the use of conventional matrices is limited, or even impossible, allowing bone to represent an alternative analytical matrix. The aim of the present study is the development and validation of an analytical method for the detection and quantification of drugs in bone, to be applied in the investigation of suspected fatal intoxications. **Methods:** Diazepam and its main metabolite, nordiazepam, were selected as test drugs due to the extensive use and frequency of detection in post-mortem toxicological analysis. Briefly, after removing all remaining tissue, small bone fractions, obtained from pig, were dried, and powdered with a grinding mill. After spiking 100 mg of the bone powder with 10 µg/mL diazepam and nordiazepam, two extraction procedures were tested, one based on a liquid extraction, and one based on a solid phase extraction using commercially available Waters OASIS HLB 3 cc columns. Quantification was performed with an HPLC-DAD using water/methanol (30:70) as mobile phase, at a 0,8 mL/min flow, using a Waters Spherisorb ODS2 C18 5µm column. Detection wavelength was set at 230 nm. **Results:** Preliminary validation data showed that with the liquid extraction, precision remained under 15% and accuracy ranged from 84,7% to 129,4% for nordiazepam and from 86,8% to 118,2% for diazepam. Recovery was 65% for nordiazepam and 74% for diazepam. Regarding the solid phase extraction, recovery was 48,8% for nordiazepam and 69,5% for diazepam. **Conclusions:** The liquid extraction procedure may be the preferred extraction method to reach the aim for this work. However, the recovery rates fall below the expected results, so further improvement of both extraction protocols is being undertaken to fully validate the method with an optimized extraction procedure. Additionally, a more sensitive quantification method using LC-MS is expected to improve the relatively low sensitivity of the HPLC-DAD quantification method.

Keywords: Bone, Forensic Analysis, Analytical Method, Drug Quantification.

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21921 | Development of lipid nanoformulations for light-based therapies

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Background & Aim: Since ancient times, Egyptians and other civilizations have relied on sunlight to treat skin conditions [1]. At the beginning of the 20th century, the importance of light in the treatment of diseases was recognized and Niels Finsen was awarded the Nobel Prize in Physiology or Medicine in 1903, marking the start of modern phototherapy [1]. The first reports of a *photodynamic effect* were presented by Raab in 1898 followed by von Tappeiner in 1905, who introduced the term photodynamic therapy (PDT) [2,3]. PDT is a type of phototherapy that employs photosensitizers triggered by specific light wavelengths to generate reactive oxygen species, sensitizing cells and inducing their death [1]. Curcumin, a natural compound obtained from *Curcuma longa*, was selected as a photosensitizer. Despite its therapeutic potential in cancer PDT, curcumin presents challenges such as low water solubility and chemical instability [4], which can be solved through incorporation into nanoparticles. **Methods:** Solid lipid nanoparticles (SLN) and nanostructured lipid carriers (NLC) were synthesized, optimized, and characterized for future use in cancer PDT. To improve the therapeutic effect, an additional natural compound with demonstrated anti-cancer activity, cinnamon oil, was used as the liquid lipid in the NLC. **Results:** The results showed that the nanoparticles had suitable sizes for intravenous administration, a small polydispersity index, and a negative surface charge. A high encapsulation efficiency was also achieved. Moreover, the release of curcumin was minimal at physiological pH, suggesting that the drug would not be released into the blood circulation but only into the tumoural microenvironment. The nanoparticles also exhibited no signs of hemolysis *in vitro*. **Conclusions:** To conclude, the developed nanoformulations are a promising therapeutic approach for cancer PDT. The assessment of the efficacy of the lipid nanoparticles in eliminating cancer cells is one of the future research goals.

Keywords: Cancer, Photodynamic Therapy, Nanoparticles, Curcumin.

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21956 | Revolutionizing Spine Health: *in vivo* validation of a fetal-inspired biomaterial

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Background and aim: Low back pain (LBP) affects over 80% of the people and is often caused by intervertebral disc (IVD) degeneration¹, which occurs with ageing². Our group has recently demonstrated that decellularized fetal bovine IVDs, co-cultured with adult disc cells, presented higher levels of Aggrecan and Collagen II (prototypical of a healthy environment) and an increased anti-angiogenic effect *in ovo*³. Given the lack of effective solutions for IVD degeneration⁴, the aim of this work was to validate the therapeutic potential of the previously developed fetal-inspired biomaterial *in vivo*. **Methods:** IVDs from fetal bovine tails (local abattoirs' byproducts) were isolated and decellularized using a previously optimized detergent-based protocol³. Different milling methods were tested to enable injectability through a 30G needle, namely Pulverisette 23 (Fritsch), Analytical Mill A10 basic (IKA) and 4-place Mini Bead Mill homogeniser (VWR). Automatization and optimization of a scalable decellularization process, as well as its yield, were also addressed. Wistar rat IVDs at 14-16 weeks old were needle punctured to induce degeneration and, 2 weeks after lesion, the biomaterial under study was administered. Animals were sacrificed 4 weeks after treatment. Pain behavior (von Frey test), IVD height (MRI), degeneration score and hernia volume (histology) were assessed. **Results:** The Mini Bead Mill was the best option for milling, enabling injectability in 50 cycles. Vacuum improved decellularization process rate. Regarding Von Frey, fetal administration shows differences in sensitivity when compared to the lesion, presenting similar levels to naïve. Contrarily, saline exhibits reduced sensitivity, suggesting analgesia. Remaining parameters are currently under evaluation. **Conclusion:** This preclinical study validates the injectable fetal-inspired biomaterial in a rat model of IVD degeneration, opening new avenues for LBP treatment while promoting circular economy by using waste for biomaterial production.

Keywords: biomaterial, decellularization, degeneration, intervertebral disc, *in vivo* study.

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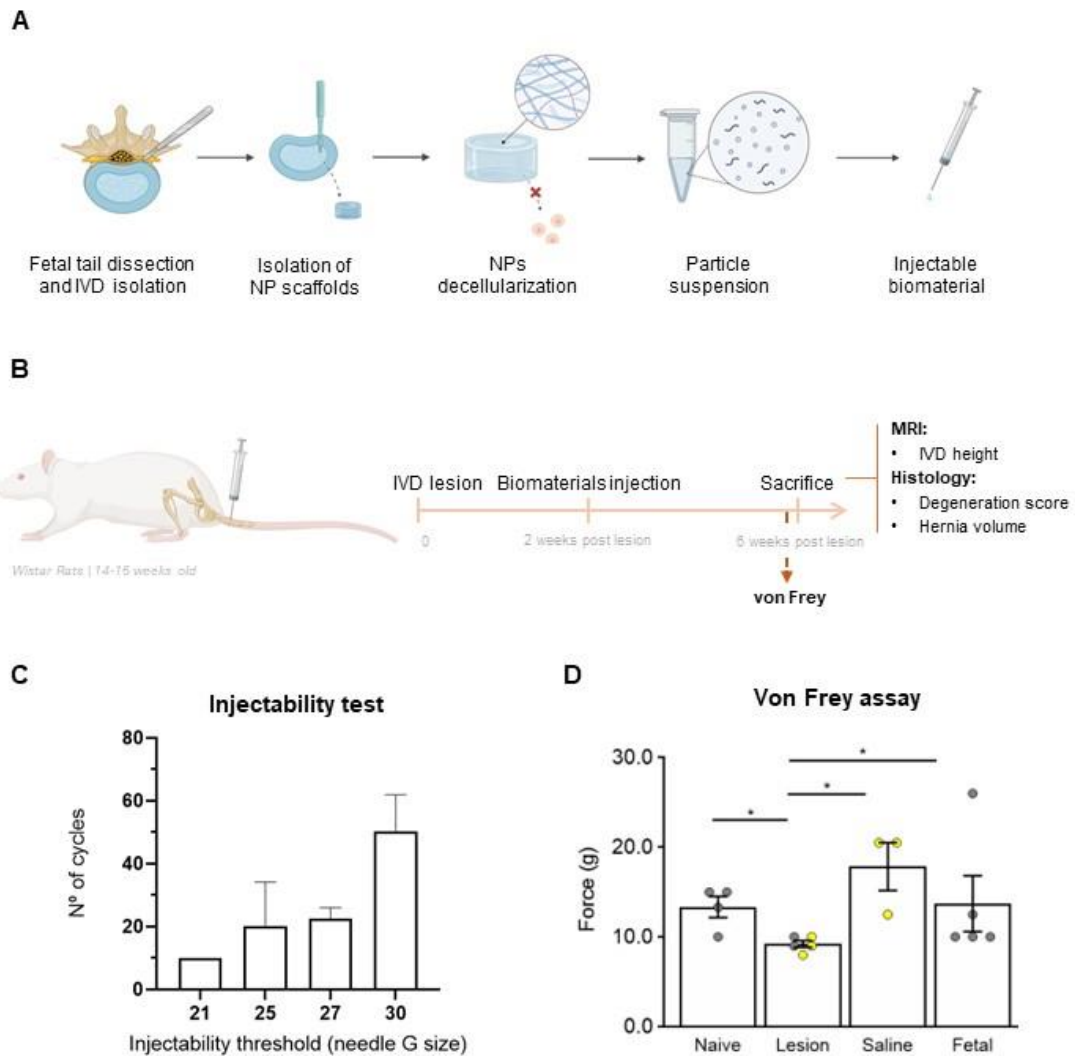


Figure 1: A) Schematic representation of biomaterial production. B) *in vivo* timeline and parameters evaluated. C) Biomaterial injectability test. D) Behavioural test by Von Frey. Data presented with bar graphs with mean and standard deviation. Mann Whitney test (one-tailed) was performed. Differences were considered statistically significant if * $p < 0.05$ vs. lesion group.

21975 | Unusual bilateral relation between the median nerve and the brachial artery: an anatomical case report

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Background & Aim: The median nerve is formed by the union of the medial root from the medial cord and lateral root from the lateral cord of the brachial plexus [1-4]. The median nerve enters the arm from the axilla, and passes vertically down in the anterior compartment in close relation with the brachial artery throughout its course [1,2]. As it descends through the arm, it lies at first lateral to the brachial artery, and near the insertion of the coracobrachialis muscle it crosses the artery, usually in front, and thus more distally it lies on the medial side of the artery [1-4]. The aim of this study is to describe a variation in the relation between the median nerve and the brachial artery. **Methods:** A formalin-embalmed adult male human Portuguese cadaver was subjected to standard anatomical dissection at the Unit of Anatomy, Department of Biomedicine, Faculty of Medicine, University of Porto. The studied cadaver derived from a body donation with informed consent, written and signed by the donor himself (Portuguese Decree-Law Nº 274/99). As per routine in our Unit, appropriate dissection techniques were performed by using proper dissection tools in order to achieve the teaching and research objectives of the human cadaveric dissection [1-6]. **Results:** The dissected cadaver showed a bilateral variation in the common relation between the median nerve and the brachial artery. Actually, as the median nerve descends through the arm, it crosses the brachial artery posteriorly from the lateral side of the artery to its medial side. **Conclusions:** We found a rare bilateral anatomical variation in which the median nerve crossed posteriorly the brachial artery. The detailed knowledge of the anatomical variations of the relation between the median nerve and the brachial artery, even if rarest, is of the utmost anatomical, clinical and surgical importance for all health professionals who have to perform procedures on the upper limb in order to avoid iatrogenic injury of these structures.

Keywords: Anatomical Variation, Brachial Artery, Human Cadaveric Dissection, Median Nerve.

Acknowledgments

The authors sincerely thank those who donated their bodies to science so that anatomical research could be performed. Results from such research can potentially increase mankind's overall knowledge that can then improve patient care. Therefore, these donors and their families deserve our highest gratitude.

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21990 | Exploring the Intricacies of Inflammation in Epilepsy: a preliminary study on the role of peripheral monocytes

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Background & Aim: Inflammation is an epilepsy hallmark, with microglia cells and brain-infiltrating monocytes playing an important role. This study aims to analyze the function of peripheral monocytes in patients with Mesial Temporal Lobe Epilepsy with Hippocampal Sclerosis (MTLE-HS). For that expression of inflammatory mediators involved in the IL-1 β pathway will be evaluated in peripheral monocytes from patients and healthy individuals. Additionally, the response of monocytes to LPS stimulation, will be evaluated through the quantification of the inflammation-associated microRNAs miR-146a and miR-22. **Methods:** Total peripheral blood was collected in CPTTM tubes, from four patients with MTLE-HS and four healthy controls. RNA was extracted from CD14+ monocytes isolated from PBMCs and P2X7R, TLR4, NF-kB, IL-1 β and UBC mRNA levels were evaluated through quantitative Real-Time Polymerase Chain Reaction. The CD14+ monocytes of patients and controls were cultured and stimulated with LPS and the expression levels of miR-146a and miR-22 were evaluated through quantitative Real-Time Polymerase Chain Reaction. **Results:** In epileptic patients (EP)- derived monocytes stimulated with LPS, miR-146a levels significantly increased (3.24-fold, $p < 0.05$) compared to homeostatic conditions. These differences were not observed in the control group. No significant differences were found in miR levels between EP-derived and control-derived monocytes under both conditions. Additionally, gene expression analysis of P2X7R, NF-KB, TLR4, and IL-1 β did not reveal significant differences between patient and control groups. **Conclusions:** These results suggest that EP-derived monocytes may be more prone to a dysregulated inflammatory response when stimulated. These results must be carefully analyzed due to the smaller sample size, emphasizing the need for further comprehensive phenotypic and molecular characterization of activated monocytes, a work currently underway.

Keywords: Epilepsy, Inflammation, Mir, Monocytes.

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22006 | AI at the bedside: a pathway to anticipating patient deterioration in intensive care?

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Background & Aim: In Intensive Care Units (ICU), the rapid and accurate prediction of patient's deterioration is crucial. Traditional methods, while valuable, face limitations in handling the complex, multifaceted data characteristics of critical care settings [1,2]. This study aims to identify and assess the effectiveness of the existing Artificial Intelligence (AI) in predicting ICU patient deteriorations. **Methods:** A literature search was conducted on PubMed® database in February 2024, analyzing studies from 2014 to 2024 that employed AI models to predict patient deteriorations in ICUs, focusing on adult population. The search, using the query "Artificial Intelligence AND Deterioration Prediction AND Intensive Care", yielded 121 articles, with a final inclusion of nine after applying specific inclusion and exclusion criteria. **Results:** AI technologies offer significant advantages, including the ability to analyze large data volumes and identify complex patterns not discernible through conventional methods. In ICU settings, AI models aimed to predict various clinical outcomes related to patient deterioration, such as identification of respiratory and hemodynamic deterioration, and mortality. In general, AI models demonstrated enhanced predictive accuracy, with a Deep Learning (DL) model achieving an AUC score of 0.982 [3], showcasing superior performance over traditional methods. **Conclusions:** Despite the promising results and advancements, potentially enabling more timely and targeted interventions, the challenges in interpretability, generalizability and clinical integration persist. The "black box" nature of DL models, for example, raises questions about their transparency and operational understanding [4]. Other concerns like privacy, ethics, and costs associated with these technologies also require careful consideration. Therefore, addressing these concerns and AI models' current limitations is crucial for their successful integration into healthcare.

Keywords: Artificial Intelligence, Deterioration Prediction, Icu.

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22010 | Cannabidiol (CBD) reduces bladder filling sensitivity and acetylcholine release from cholinergic nerves at the rat urinary bladder

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Background & Aim: Cannabidiol (CBD) is a phytocannabinoid devoid of psychoactive effects. CBD is known to ameliorate chronic pain and reduce epileptic crises in children. It can also improve the bladder control in patients with Multiple Sclerosis (1). CBD has little affinity for CB1 and CB2 receptors (2). Overall, these findings prompted us to investigate the mechanisms underlying CBD bladder effects and to whether this drug can be helpful to control bladder overactivity in other pathological conditions. **Methods:** Here, we used both in vitro (quantification of nerve-evoked [³H]-ACh release from isolated bladder strips with and without the urothelium) and in vivo filling cystometry experiments in urethane-anaesthetized rats. All animal procedures were according to the ARRIVE 2.0 guidelines and approved by DGAV and ORBEA (ICBAS, No.224/2017). **Results:** CBD (10μM, applied for 15 min) inhibited [³H]-ACh release from electrically-stimulated (10Hz, 200 pulses; S1 and S2) whole bladder strips (S2/S1: 0.63±0.09, n=5), but the magnitude of the inhibitory effect of CBD (10μM) was attenuated upon removing the urothelium (S2/S1: 0.84±0.06, n=5). The inhibitory effect of CBD was concentration-dependent as it was more evident upon increasing the concentration of CBD to 30μM. In the anaesthetized rat, instillation of CBD (10 μM) into the lumen of the bladder increased the voiding pressure threshold (PTh) and decreased the inter-contraction interval (ICI) roughly by 20-30% (n=2). **Conclusions:** These results suggest that CBD decreases both the bladder filling sensitivity and ACh release from cholinergic nerves innervating the rat urinary bladder, thus partially explaining its putative therapeutic role in overactive bladder syndromes.

Keywords: Cannabidiol, Cholinergic Neurotransmission, Urinary Bladder, Overactive Bladder.

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22014 | iPSC-driven spheroids for cardiac patch vascularization

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Background & Aim: The development of heart failure after myocardial infarction (MI) is a major global healthcare burden [1] that urgently requires novel therapeutic tools. Engineered heart tissues (EHT) have the potential to radically improve conventional therapeutic management but, once implanted, cell engraftment is low, at least in part, due to inefficient vascular integration [2]. This work aims to develop a vascularization patch (VP) composed of spheroids of induced pluripotent stem cell (iPSC)-derived cardiac fibroblasts (CFs) and endothelial cells (ECs) that will work as vascularization units (VUs) to allow timely inosculation of cardiac patches. **Methods:** The spheroids will be initially optimized through co-culture of outgrowth endothelial cells (OECs) and mesenchymal stromal cells (MSCs) but, due to the translational potential of iPSC-derived cells, iPSCs-derived CFs and ECs will integrate the final VP. After spheroid formation in an agarose mold, a fibrin-alginate hydrogel will be formed on top of the spheroids. Hence, following agarose mold detachment, a patterned hydrogel structure will hold equally distant VUs ready to be implanted (Figure 1). A classical fibrin assay will be applied to analyze the sprouting capacity of the VP. **Results:** An optimization of the cell ratio and incubation time of the spheroids allowed the selection of the 5:1 MSC/OEC ratio and 24-hour conditions to be used in the VP. Several fibrin-alginate combinations are now under test to elect the best hydrogel composition to concomitantly preserve the VP structure and spheroid viability and functionality. iPSCs were differentiated into ECs and characterized through immunohistochemistry with adequate lineage markers. A new protocol for CF differentiation is also under refinement. **Conclusions:** This work set the basis for the fabrication of a VP that may be implanted along with cardiomyocytes to promote timely inosculation with the host and overcome an important bottleneck in the clinical deployment of EHT.

Keywords: Myocardial Infarction, Fibrosis, Microtissues, Vascularization, Ipscs.

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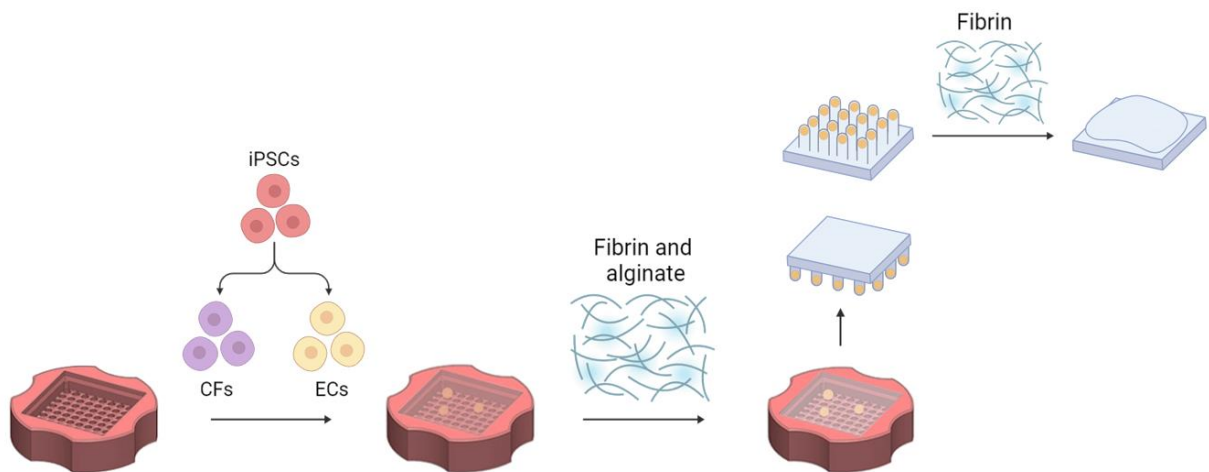


Figure 1: Experimental design.

22020 | Validation of the Adult Asthma Epidemiological Score: a secondary analysis of EPI-ASTHMA

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Background & Aim: The A2 score is an 8-question patient-reported outcome measure that has been validated for ruling in (score ≥ 4) and ruling out (score 0-1) asthma. However, this screening tool has been validated in a cohort similar to the derivation cohort used. This study aims to validate the predictive accuracy of the A2 score in a primary care population against general practitioner (GP) clinical assessment and to determine whether the proposed cut-offs are the most appropriate. **Methods:** This accuracy study is a secondary analysis of the EPI-ASTHMA population-based study. Random adult participants recruited from primary healthcare centers in Portugal were analyzed. Participants answered the A2 score by telephone interview. Those with an A2 score ≥ 1 (plus 5% with an A2 score of 0) were invited to a diagnostic visit carried out by a GP to confirm or not a diagnosis of asthma. Diagnostic accuracy was assessed using receiver operating characteristic (ROC) curves. **Results:** A total of 1283 participants (median 54 [p25-p75 43-66] years; 60% female) were analyzed. The A2 score showed high discriminatory power in identifying asthma, with an area under the ROC curve of 82.9 (95%CI 80.4-85.4)%. The proposed cut-off ≥ 4 was the most appropriate to rule in asthma (specificity 83.1%, positive predictive value 62.4%, accuracy 78%). Similarly, the proposed cut-off < 2 was the most suitable for excluding asthma (sensitivity 92.7%, negative predictive value 93.7%, accuracy 60.5%). **Conclusions:** The A2 score is a useful tool to identify patients with asthma in a primary care population.

Keywords: Asthma, Epidemiology, Diagnostic Screening, Patient-Reported Outcome Measure.

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22021 | Modeling and minimizing delay in diagnosis of diseases caused by mycobacteria

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Background & Aim: Minimizing delay in diagnosis is critical for effective treatment and disease control. Despite advancements in tuberculosis treatment, diagnostic delays persist, necessitating investigation into contributing factors. Our study aims to identify demographic variables associated with delayed healthcare visits and diagnosis, potentially impacting patient prognosis, and to evaluate the information that is possible to extract from the SVIG-TB dataset.

Methods: We employed statistical and machine learning techniques to analyze demographic data and its correlation with diagnostic delay. Our methods included classical linear/logistic regression, tree ensembles, boosting and chi-squared tests to identify significant features. We investigated the feasibility of training a generalizable machine learning model by assessing model performance through classical evaluation metrics, but also by using a method where labels are increasingly shuffled, to compare performance with that of other known classifiable datasets. **Results:** We identified several demographic variables correlated with delayed healthcare visits and diagnosis, like unemployment or alcoholism, posing risks to patient outcomes. However, we found the data insufficient for characterizing the sample and training a reliable machine learning model. We also propose a new method of ascertaining the classification ability of machine learning algorithms on a dataset, involving label shuffling, to compare what we can learn with real data, as opposed to randomized labels. In this case, the drop-off in accuracy is slow with an increasing proportion of labels shuffled, and even with 0% labels shuffled, we don't obtain significantly better accuracy than other standard "classifiable" datasets with a shuffling approaching 100%, in binary classification. **Conclusions:** We recommend revising data collection methods to enable the development of predictive models for aiding public health interventions in the future.

Keywords: Tuberculosis, Diagnosis Delay, Machine Learning, Healthcare Delay.

22026 | Clinical Use of Probiotics in the Prevention of Peri-implantitis: A systematic review

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Background & Aim: Peri-implantitis, characterized by inflammation and bone loss around dental implants, is initiated by the buildup of a dysbiotic plaque. As a therapeutic strategy, mechanical debridement (MD) alone has proven inadequate to fully restore the peri-implant health, hampered by challenges in completely removing bacteria from the rough surfaces. Accordingly, there has been a quest to develop strategies that complement MD. Among these, probiotics, beneficial live microorganisms that confer health benefits when consumed in proper amounts, have demonstrated effectiveness in modulating diseases of the periodontum. Accordingly, this systematic review aims to evaluate the clinical efficacy of probiotics in preventing the development of peri-implantitis. **Methods:** This study has been conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A search strategy using Boolean keywords “Probiotics” AND “Peri-implantitis” was applied across four databases: PubMed, Scopus, Web of Science and Google Scholar. Studies were selected based on inclusion – full access, language, study design, sample constituted by patients with mucositis, evaluation of clinical and microbiological parameters – and exclusion criteria – study design. **Results:** Only five studies fulfilled the selection criteria. Three of these demonstrated that the administration of probiotics showed therapeutic advantages. Regarding microbiological outcomes, probiotics were found to decrease the microbial load, though without significantly alter the overall microbiota. **Conclusions:** The findings suggest a moderate benefit of probiotics in preventing peri-implantitis development, with potential for clinical use. However, due to limited evidence and varied study designs, further, more standardized research is needed to fully ascertain their effectiveness.

22045 | Pregnancy Supplementation, Anthropometry and Early Childhood

Development

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Background & Aim: Iron (Fe), iodine (I) and folic acid (FA) supplementation is commonly recommended during pregnancy. Although there is evidence on the effects of this supplementation on various children's outcomes, uncertainty persists, particularly in Portugal where studies are scarce. Our aim is to investigate the prevalence of Fe, I and FA supplementation in pregnancy and its association with infant anthropometric and neurodevelopment data. **Methods:** This study relies on the SleepPsy study. Parents with children aged 18-30 months, born at term and without a previous diagnosis of developmental disorders were invited to participate through mass and social media. Children taking medication other than supplements, as well as twins, were excluded. Information regarding pregnancy and anthropometry at birth was retrospectively collected at the day of assessment. Current anthropometric measurements and neurodevelopment (Scale of Growing Skills II) were assessed in person at 18-30 months. **Results:** Of 171 children, median age (P25; P75) of 22 months (20; 25), 59% were boys, 73% were single children and 76% attended daycare. The prevalence of Fe, I and FA supplementation during pregnancy were 77%, 71% and 86%, respectively, with the majority (61%) reporting combined supplementation with the 3 micronutrients. At birth, 90%, 84% and 86% of the children had normal weight, length and head circumference. However, at 18 and 30 months of age only 69% of children had normal weight and 2 to 40% of children were classified as having a developmental age for the different assessed skills below the chronological age. Further analysis will explore the association between prenatal micronutrient supplementation and anthropometric and neurodevelopment data. **Conclusions:** This study shows a high prevalence of micronutrient supplementation in pregnancy. Further analysis will contribute to the assessment of current national health policies focused on pregnancy nutrition.

Keywords: Micronutrient Supplementation, Pregnancy, Neurodevelopment, Anthropometry, Scale of Growing Skills II.

22050 | Artichoke: a versatile nutraceutical

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Background & Aim: Known as artichoke, the *Cynara cardunculus* L. var. *Scolymus* originated in the Mediterranean region and is now cultivated in several countries like Italy, Egypt, and Spain. The artichoke has leaves, a stem, and a head, a floral capitulum, covered with green and pointed bracts. The leaves, external bracts, and stems correspond to about 80–85% of the total biomass of the plant and represent a suitable potential source of food additives and nutraceuticals. We decided to make the artichoke the aim of our work because it has been associated with various health benefits and used in plant-based dietary supplements and herbal infusions. **Methods:** The paper reviews the current literature concerning the properties of different parts of *C. scolymus*, its by-products and food supplements. The literature was obtained by a search of PubMed, MDPI and ScienceDirect using keywords as “*Cynara cardunculus* L.”, “artichoke”, and “benefits” with extra papers being identified by manually reviewing the references. **Results:** Its edible parts have shown various biological activities, including anti-cancer, hepatoprotective, and antimicrobial potential. The leaves are mainly used in infusions and extracts for their health-promoting properties. Its chemical composition is packed with polyphenols, flavonoids, anthocyanins, phenolic compounds (...), and therefore it can be used in a diversity of applications, including medicine, biofuels and the food industry. Studies showed that artichokes have antioxidant, anti-inflammatory, antimicrobial, anticancer, hypocholesterolemic, cardioprotective, hepatoprotective, and lipid-lowering effects. **Conclusions:** The properties mentioned above make the artichoke's high-value sustainable natural compounds great candidates for reincorporation into the food supply chain, to improve functionality, as well as for food preservation purposes, replacing additives whose consequences remain uncertain in the long term, all in the scope of the circular economy.

Keywords: Artichoke, Nutraceutical, Properties, Versatility.

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22091 | Application of the NAM-FISH Method for Oral Biofilm Study

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Background & Aim: The study aims to identify *Streptococcus sp.* in real oral microbiota samples, using fluorescence *in situ* hybridization (FISH) with nucleic acid mimics (NAM), namely Locked Nucleic Acid (LNA) and 2'-O-methyl-RNA (2'OMe) to improve FISH efficiency. NAMs offer benefits such as enzymatic resistance, synthetic specificity, and increased affinity for target sites, enhancing hybridization success and enabling discrimination of single-base mismatches. The approach allows analysis of multiple species samples, aiding molecular-level detection and understanding of cellular mechanisms, morphology, and biofilm relationships, especially when combined with CLSM microscopy. **Methods:** In this study, dental plaque samples will be collected from adult patients at the Faculty of Dental Medicine, University of Porto. Consent will be obtained prior to sample collection. Subgingival and supragingival samples will be collected using a sterile Gracey curette, stored in 0.9% NaCl solution, and frozen at -20°C. Subgingival samples will be from pockets >5mm deep, and supragingival samples from plaque-exposed areas. Samples will undergo fixation, then 30 µL will be spread on a microscope slide. Will be added 20 µL of 200nM *Streptococcus*-specific LNA/2'OMe probe, hybridized at 60-64°C for 1 hour, and washed for 30 minutes. Fluorescence microscopy will be used for examination. **Results:** The *Streptococcus*-specific LNA/2'OMe probe was designed, has a theoretical specificity and sensibility of 100% and 97.32%, respectively. It was, also, already tested three hybridization temperatures: 60°C, 62°C and 64°C with *Streptococcus* strain, hybridizing at all temperatures. However, these are preliminary studies, and more experiments are needed. **Conclusions:** The NAM-FISH technique can be a high-performance tool to complementarily study real oral biofilm samples, identify microorganisms within the samples and comprehending the dynamics and complexity of this diverse microbial community.

Keywords: Oral Biofilm, Dental Plaque, Fluorescence In Situ Hybridization, Nucleic Acid Mimics.

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22105 | Internal Fit of 3D Printed occlusal splints: impact of build orientation

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Background & Aim: In dentistry, occlusal splints are devices commonly used to treat or relieve the symptoms of temporomandibular disorders and bruxism. [1,2] The internal fit of occlusal splints is an essential condition that directly affect longevity and therapeutic success. [2] With the advancement of CAD/CAM technology, these devices have been manufactured using additive manufacturing such as three-dimensional (3D) printers. [3] However, scientific information about build orientation is scarce. [3] Thus, the objective of this study was to evaluate the internal fit of 3D printed occlusal splints manufactured with different orientations.

Methods: An occlusal splint was designed using CAD software (Exocad GmbH, Darmstadt, Germany) and exported as standard tessellation language (STL) file. From this digital model, thirty occlusal splints were manufactured with a resin (cosmos splint, Yler) using a 3D printer, with three different build orientation: 0°, 45° and 70° (n=10). The three groups were scanned using an extraoral scanning system (Identica T500, Medit). All best-fit superimpositions were conducted between the digital model and the occlusal splints obtained (figure 1). A P < .05 level was considered significant. **Results:** The internal fit values - measured as the root mean square (RMS) found in this study are in accordance with those found in the literature, although no statistically significant differences were found between the different build orientations evaluated. **Conclusions:** Additive manufacturing such as 3D printers is a valid technique to produce occlusal splints. Although build orientation did not affect internal fit, further studies with different resins and orientation angulations are mandatory.

Keywords: Additive Manufacturing, Internal Fit, Occlusal Splints, Three-Dimensional Printing,

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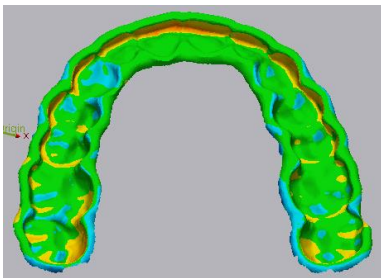


Figure 1: Color deviation map between digital model and a 3D printed occlusal splint

22108 | VPAC₁ may be a novel target to prevent epileptogenesis and to attenuate cognitive deficits in epileptic patients

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Background & Aim: Epileptogenesis is the process by which a healthy brain becomes susceptible to seizures. Excessive activation of ionotropic glutamate receptors (e.g. AMPA) causes neuroexcitotoxicity. Overactivation of AMPA receptors can cause deleterious effects including abnormal synaptic plasticity, commonly seen in the epileptic brain [1,2]. Vasoactive intestinal peptide (VIP) receptors are upregulated in patients with severe cognitive deficits due to Mesial Temporal Lobe Epilepsy (MTLE), suggesting an involvement of VIPergic mechanisms in abnormal synaptic plasticity [3,4]. VIPergic mechanisms underlying the epileptic modifications and their relation with the expression and function of AMPA receptors in epileptics remain elusive [5], therefore we set to evaluate the crosstalk between VIP receptors activation and GluA1/GluA2 AMPA receptor subunits in two “in vitro” models of hippocampal epilepsy. **Methods:** Hippocampal slices (400 μm thick) from male Wistar rats (n=3) superfused with aCSF were exposed to 10-min hypoxia (HYPX) or oxygen-glucose deprivation (OGD) insults either in the absence or presence of the VPAC₁ receptor antagonist, PG97-269 (100 nM). Membranes were prepared for Western blot analysis. **Results:** Under both HYPX and OGD conditions, we observed a huge increase (P<0.05; n=3) in VPAC₁ receptor levels in hippocampal membranes, and few changes in VIP or VPAC₂ receptor protein densities. The GluA1, but not the GluA2, subunit of the AMPA receptor were enhanced (P<0.05; n=3) in hippocampal slices submitted to HYPX. No changes in GluA1 subunit levels were detected during OGD conditions, yet Ser831 phosphorylation increased while Ser845 phosphorylation decreased. Involvement of endogenous activation of VPAC₁ receptors on GluA1 subunit overexpression and Ser831 phosphorylation under HYPX and OGD conditions, respectively, was demonstrated by prevention of both effects with the selective VPAC₁ receptor antagonist, PG 97-269 (100 nM). **Conclusion:** Data suggests that VPAC1 overexpression in the hippocampus during HYPX and OGD promotes upregulation and phosphorylation of AMPA receptor GluA1, enhancing synaptic

plasticity in this way VPAC1 could be a new target to prevent epileptogenesis and reduce cognitive deficits in epilepsy.

Keywords: VIP, VPAC1 Receptor, Epileptogenesis, Epilepsy “On-A-Dish”.

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22116 | Multi-omics analysis of TNBC organoids reveals an Endosomal Recycling regulation landscape specific of invasive cells

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Introduction: Metastatic dissemination remains the primary cause of cancer-related mortality. Yet, the underlying mechanisms driving cell migration and invasion are still poorly understood. Previously, we have shown that depletion of FER kinase impairs invasion of TNBC cells by controlling the endosomal sorting/recycling (ESR) pathway. Accordingly, we hypothesize that FER-dependent ESR governs cell invasion by controlling the spatial distribution and turnover of adhesion and signalling complexes. Thus, different cancer cell populations would exploit distinct ESR pathway machineries and/or mechanisms for their regulation. Hence, our research aims to dissect the ESR molecular pathway through the identification of differentially regulated ESR regulators propelling invasion and, furthermore, establishing a proof-of-concept of one particularly driving invasion in TNBC organoids. **Methods:** To test our hypothesis, we combine single-cell transcriptomics and (phospho)proteomics in TNBC PDXOs, together with electron and confocal microscopies. **Results:** Using electron microscopy, we observed a striking increase in organelles associated with ESR in invasive TNBC PDXO cells, namely ESR tubules and Golgi apparatus. In agreement, we observed an enrichment of phospho-events associated with organelle organization in invasive PDXOs. Also, invasive PDXO cells downregulate the expression of ESR machinery associated with non-invasive behaviour. To validate the requirement of a specific ESR phosphoproteomic profile to drive invasion in TNBC cells, we are currently investigating SEC16A, a key regulator of secretory and recycling pathways, which is phosphorylated downstream of FER in MM231 cells and invasive PDXOs cells. **Conclusions:** Overall, our observations are consistent with a model in which phosphorylation of ESR regulators drives the formation of recycling structures, required to control the spatial distribution of adhesion molecules at the plasma membrane, and subsequently, promote TNBC cell migration and invasion.

Keywords: Triple-Negative Breast Cancer, Endosomal Sorting/Recycling, Invasion, Metastasis, Organoids.

Acknowledgments

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HUMANITIES AND SOCIAL SCIENCES

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21352 | Spaces of transition: a comparative analysis between the *Recolhimento do Anjo* and the *Recolhimento de Nossa Senhora da Esperança* in Porto (1672-1837)

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Background & Aim: During the Modern and Contemporary Period in Porto, the *recolhimentos* were spaces used to preserve female sexual honor, which could be called into question due to the absence of a male figure, orphanhood or widowhood. The objects of this study, the *Recolhimento do Anjo* (1672-1837), an episcopal administration subordinated to royal jurisdiction, and the *Recolhimento de Nossa Senhora da Esperança* (1722 - converted into a school in the 20th century), administered by the *Santa Casa da Misericórdia do Porto*, were spaces where women entered to be away from the sins they could commit and to remain cloistered for some years of their lives, since the majority of them left years later to reenter society. This study aims to understand the movements of these women - who they were, where they came from and where they were going, as well as what family relationships they had and how these *recolhimentos* are interconnected and represent particular ways concerning female experience. **Methods:** By analyzing women's entry and exit records, as well as requirements and iconography, we created a database that allows us to cross-reference information such as the women's place of birth, residence, date of birth, baptism and death, dates of entry and exit these spaces and information about the place of birth, residence and socio-professional status of their relatives (mother, father, paternal and maternal grandparents and fiancé). **Results:** We have a total record of 485 women until this moment, highlighting orphanhood as the reason for entry and marriage as the reason for leaving these spaces. Related to the birthplace and residence of women we emphasize the parishes of *Sé*, *Santo Ildefonso* and *Vitória* and the cities of Porto and Braga regarding kinship. **Conclusions:** Ultimately, the *recolhimentos* were used to exclude women from society. Still, we found records of some moving around these spaces of transition. Can these movements be interpreted as a strategy to counter the closure of *recolhimentos*?

Keywords: Cloistered, *Recolhimento*, Social Honor, Women.

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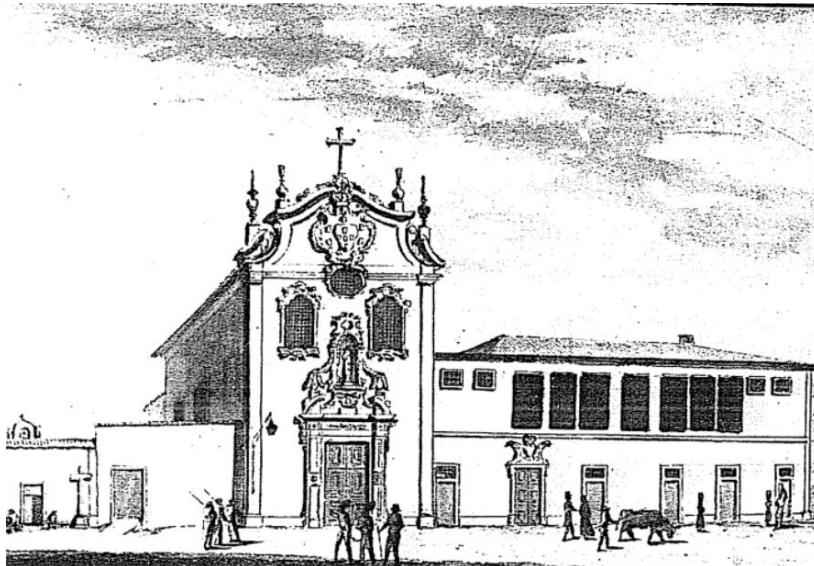


Figure 1: Recolhimento de Nossa Senhora da Esperança (1833), Joaquim Cardoso Vitória Vilanova



Figure 2: Feira da Cordoaria com o Recolhimento do Anjo em segundo plano, assinalado a vermelho (1835), J. Forrester

Portugal and the Custody of the Holy Land (1691-1765)

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Background & Aim: The Custody of the Holy Land, officially recognised as a Catholic presence in the Holy Land in 1342 [1], found in Europe the only way to support itself, organising in different places with the aim of collecting alms [2]. Portugal was no stranger to the network, seeing the formation of a commissariat in Lisbon, which coordinated the lesser hospices in the portuguese empire. **Methods:** Cross-referencing of contracts, passports and receipts available in the *Arquivo Nacional Torre do Tombo* (Lisbon) with the *Libro de Condotte*, where the goods received in the Holy Land were recorded, from the *Archivio Storico della Custodia di Terra Santa* (Jerusalem), we were able to reconstitute the journeys and the goods collected and delivered for the maintenance of the Custody of the Holy Land. To furthermore understand the Commissariat in Portugal, we used travel literature (produced in connection with the delivery of alms in Jerusalem), account reports and other correspondence available at the *Archivio Storico di Propaganda Fide* (Rome). **Results:** We have identified the relationship between various **Portuguese** monarchs and the Holy Land through alms and precious items for the liturgy, which will be on display in the Terra Sancta Museum. Similarly, from 1691 until 1833, there were annual journeys from Lisbon to deliver alms in cash and goods (items for the liturgy, spices, pharmacy products and everyday tools) to Jerusalem, in which it is possible to recognise the various individuals and map the route in some cases. **Conclusions:** Although the research is still in progress, we are led to believe that Portugal, like other territories, used the alms for the support of the Holy Places as a means of promotion and international prestige. The work in question aims to understand the formation of the Portuguese commissariat following the restoration of Portuguese independence (1640) and its activities until 1833, when it was abolished. In a second point, we will identify the goods offered and the frequency with which they arrived in Jerusalem, signalling the Portuguese presence in Christianity's holiest territory.

Keywords: Custody of The Holy Land, Alms, Travel, Jerusalem, Franciscans.

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21380 | Prostitution and venereal diseases at Hospital de Santo António (1889)

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Background & Aim: The study of prostitution is very focused on its administrative and judicial aspects, since it was in this chronology that the activity began to be regulated. In order to fill this historiographical gap, this project links prostitution with public health, seeking to study what relationships exist between these two worlds. **Methods:** The methodology applied to the study is an analysis of the source "*Livros de Entrada e Saída de Mulheres*" in the *Arquivo Histórico da Santa Misericórdia do Porto*, for the year of 1889, to carry out a case study on this subject. By collecting the information in a database, the aim is to find out who these women were, what migratory movements they made, what they did, what illness they suffered from and how they were treated at the *Hospital de Santo António do Porto*. Once collected, the data will be analysed graphically, both qualitatively and quantitatively. **Results:** As preliminary results, it is possible to say that many of the women who enter the hospital with venereal diseases resort to prostitution, but there is a significant proportion of others who are not involved in prostitution, a fact that could not have been expected from reading the literature. It's possible to verify that the hospital had a wide area of activity, since migratory movements showed women coming from all over mainland Portugal, as well as from neighbouring countries. It's fair to say that prostitutes with this type of illness were isolated in specific wards and that they usually came out cured of the disease that had afflicted them, but it was common for there to be a high number of recurrences. **Conclusions:** With the evolution of the historiography of women, we understand the need to study this group of marginalised women, deconstructing the idea that they are the main reason in the spread of venereal diseases among the population.

Keywords: Prostitution, Public Health, Venereal Diseases.

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Figure 1: Plan of the city of Porto in 1844 by F. Perry Vidal. The white outline corresponds to the old Fernandine wall (built in the 14th century and partially destroyed in the 18th century). The shape in black represents the site where the Santo António General Hospital would be built (author's markings). (SILVA, Helena da. Oporto and the construction of the modern city: the case of Santo António General Hospital in the 18th and 19th centuries. *História, Ciências, Saúde - Manguinhos* [Online]. V.21, n.2 (Apr.-Jun. 2014), p.709-725. Available on the Internet: <URL: <https://www.scielo.br/j/hcsm/a/Q8Wqr39m9M8jppYNcsCTmvs/?lang=pt>>)

21401 | Between the Sea and Shore: The Faces of Erosive Coastline at the Granja Beach

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Background & Aim: The continuous advance and retreat of the coastline, which results in ongoing changes on various time scales, has an impact on the coast, a huge dynamic environment. On a national scale, there is an increase and dispersion of coastal erosion, causing the sea's progression and the coastline's retreat ^[1]. On a case study scale, research was undertaken on a stretch of the north coast in Vila Nova de Gaia, considering the Granja beach.

Methods: This research relied on remote sensing data from Google Earth Pro (imagery from 2007 to 2023), including the coastline change analysis and the Digital Shoreline Analysis System (DSAS) tool to quantify the coastline changes ^[2]. The spatial data was generated using Esri ArcMap software and the quantitative data using Excel to generate graphical representations of the DSAS results.

Results: The results show a coastline retreat of over thirty meters in the coastline over sixteen years, with values indicating an advance towards the land. The rate of sea advance change per year was 0.5 meters, with a maximum of 2.08 meters per year. **Conclusions:** With this study, it is possible to conclude that coastal erosion constitutes a geomorphological process of concern that affects part of the coastline ^[1], altering the surface morphology of its beaches and land use. Therefore, promoting actions to mitigate these consequences is extremely important in a local context. In this context, this research has proved important because the results of the changes are evident about the coastline, in a case study, which has tended to shrink and move landwards, causing damage to beaches and nearby communities in the foreseeable future.

Keywords: Coastline, Remote Sensing, DSAS, Coastal Erosion.

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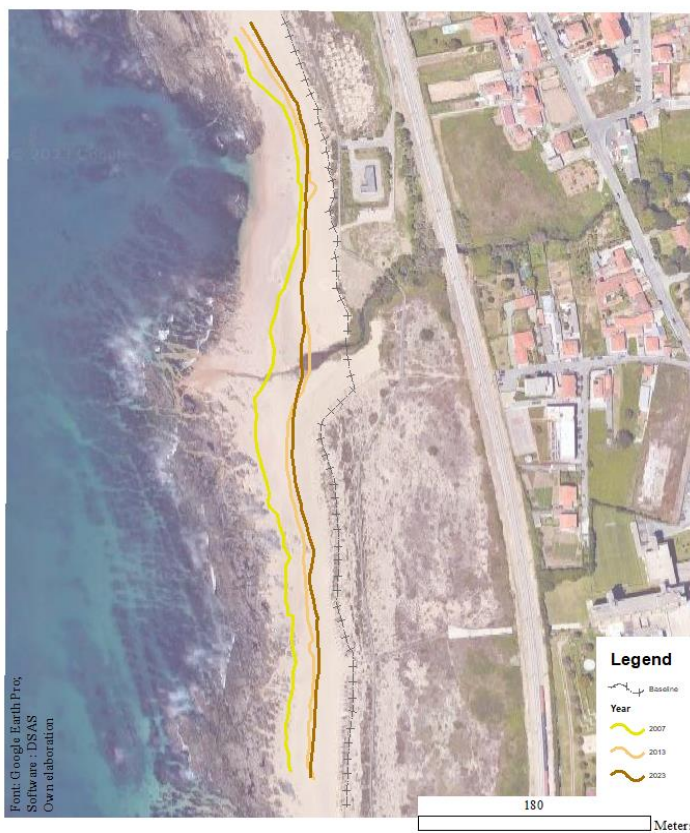


Figure 1: Coastline evolution along Granja Beach, from 2007 to 2023

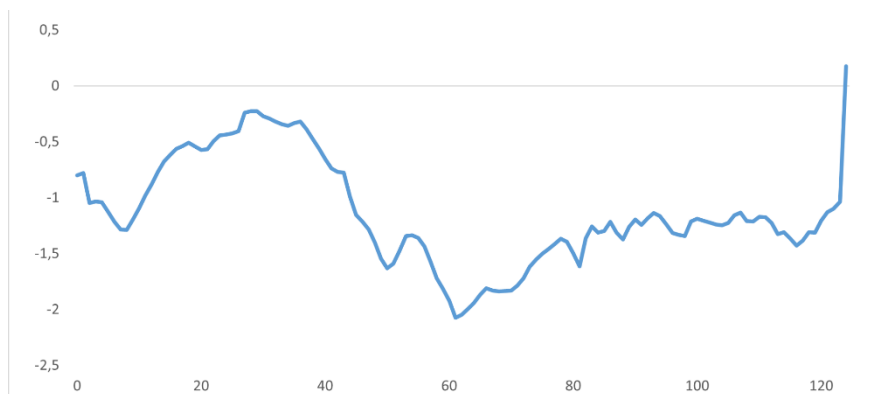


Figure 2: Results of the coastline in terms of End Point Rate by DSAS

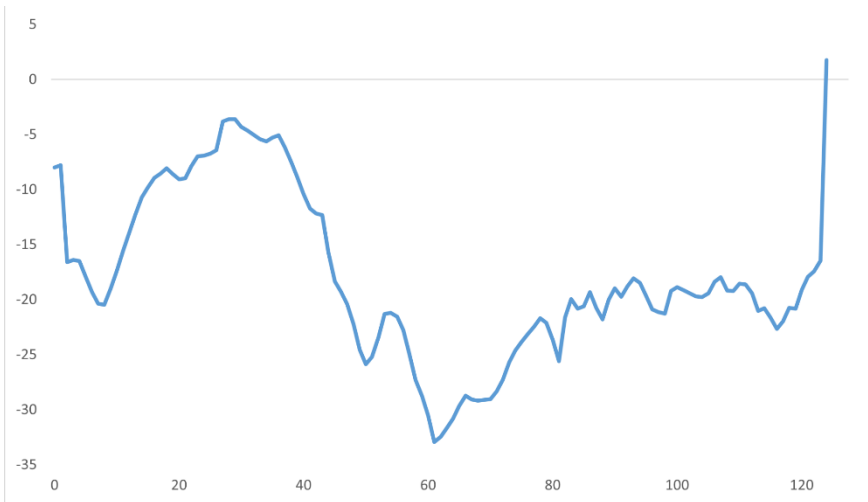


Figure 3: Results of the coastline in terms of -Net Shoreline Movement by DSAS

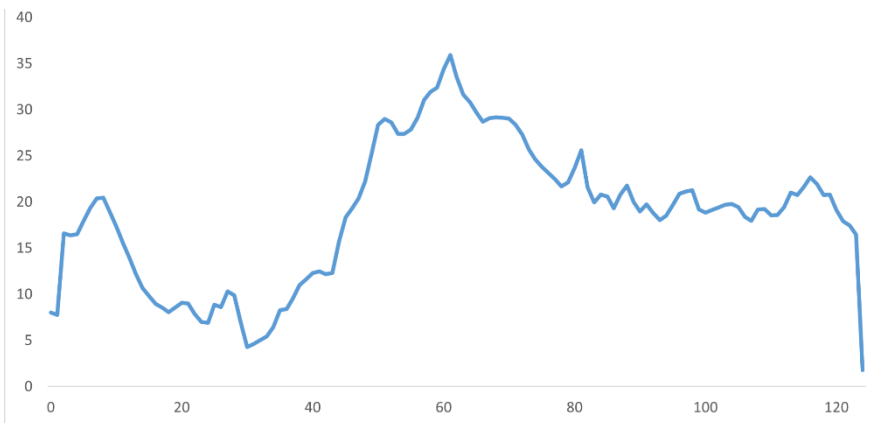


Figure 4: Results of the coastline in terms of Shoreline Change Envelopet by DSAS

21444 | Impacts of Climate Risks on Póvoa de Varzim: Agricultural and Touristic Vulnerabilities and Specificities

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Climate is an essential resource for tourism as it interacts with water availability, changes in agricultural production, increased risks of coastal erosion, etc [1]. The Póvoa de Varzim is a coastal municipality in the Northern region of Portugal, of which 51% of the land is dedicated to agriculture. It is also the municipality in the Porto Metropolitan Area with the highest proportion of overnight stays in tourist establishments during the summer months. In relation to climate risks, we are particularly interested in the increasing frequency and intensity of droughts and the impacts of rising sea levels (affecting beach tourism). The objective of this study is to understand the specificities of the agricultural and tourism sectors in the municipality in their direct or indirect relationship with vulnerabilities resulting from climate risks. It is essential to note that Póvoa de Varzim has a large area of its territory (coastal) classified as "Soils in vulnerable zones" to nitrates of agricultural origin (Figure 1). The soils are contaminated, and during periods of drought, there will be an even higher concentration of pollutants, harmful to agricultural activities and the health of the populations living there. The agricultural landscape is strongly characterized by greenhouses (Figure 2), posing special challenges. Annually, around 839 tons of methane are produced in Póvoa (Figure 3). According to Climate Central, and considering the worst-case scenarios, by 2100, 2.3% of the total area of the municipality will be flooded (Figure 4). According to the IPCC report (2021), the site estimates that the average sea level rise will be around 0.26 to 0.77 meters by 2100. In Póvoa de Varzim, the pressure induced by tourists is higher in the summer months, coinciding with months of lower water availability. This situation is further aggravated by the increased need for water for agriculture. Adaptation reduces the vulnerability of urban areas to climate risks [2].

Keywords: Agriculture, Climate Risks, Póvoa de Varzim, Tourism, Vulnerability.

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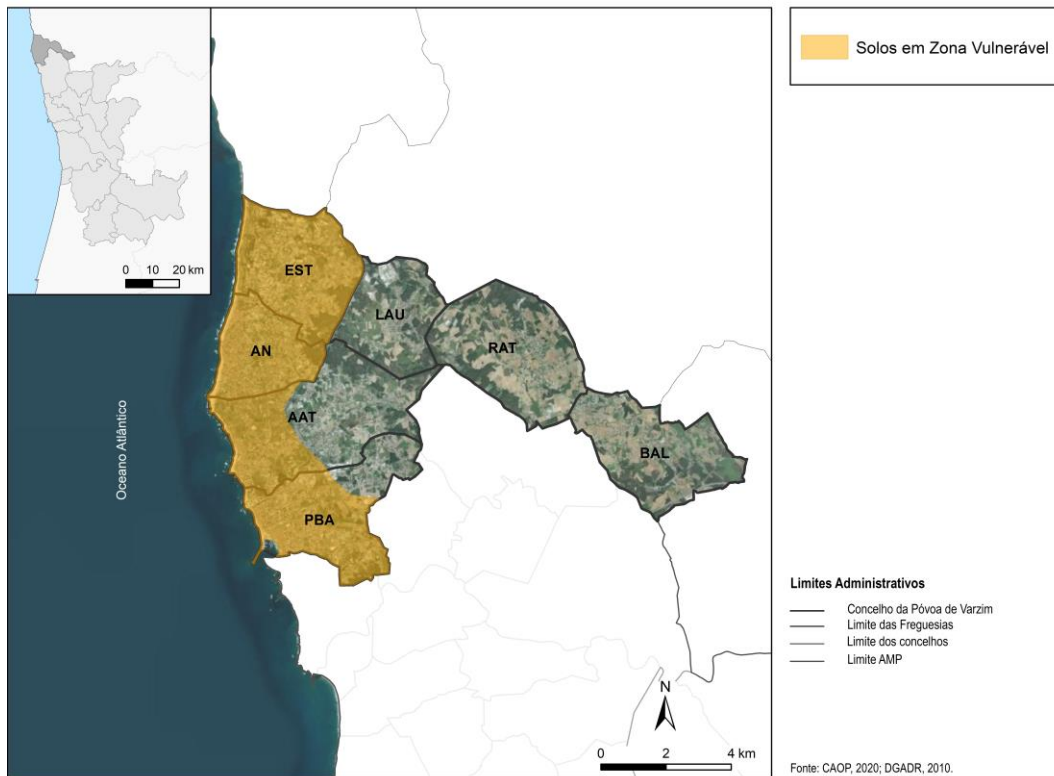


Figure 1: Soils in Vulnerable Zones in the municipality of Póvoa de Varzim

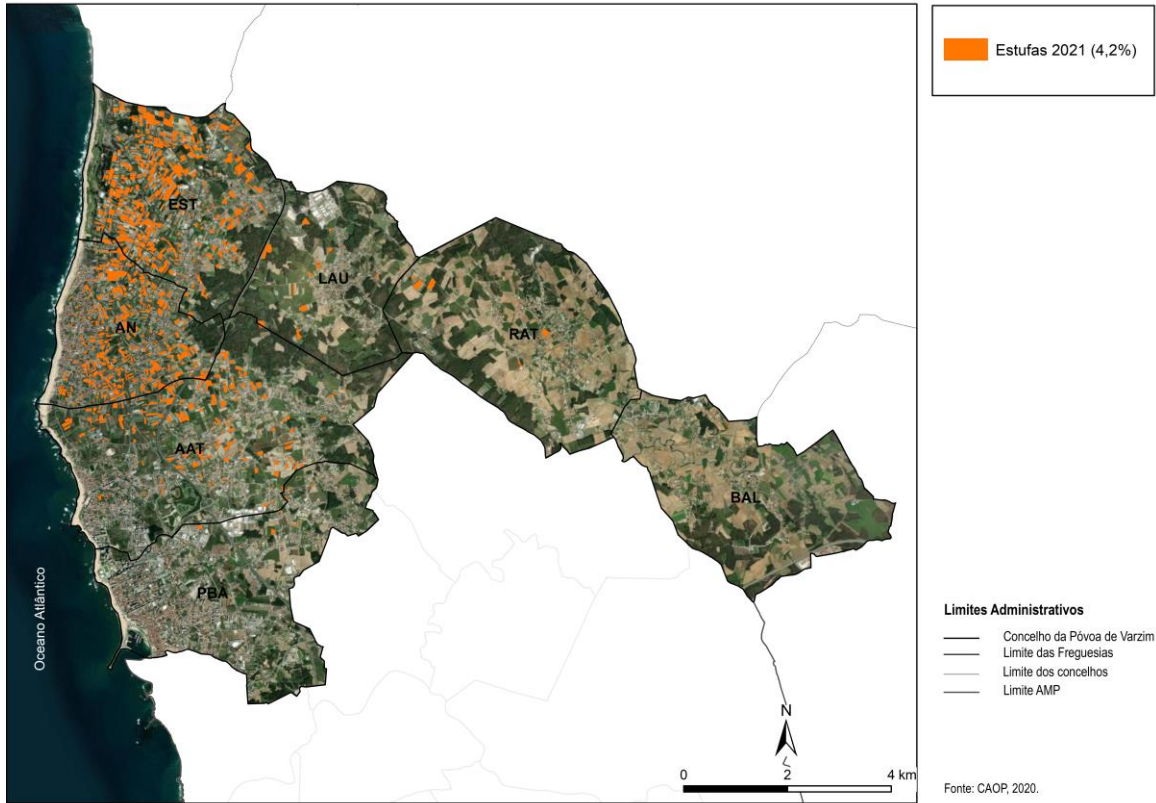


Figure 2: Location of Greenhouses in the municipality of Póvoa de Varzim

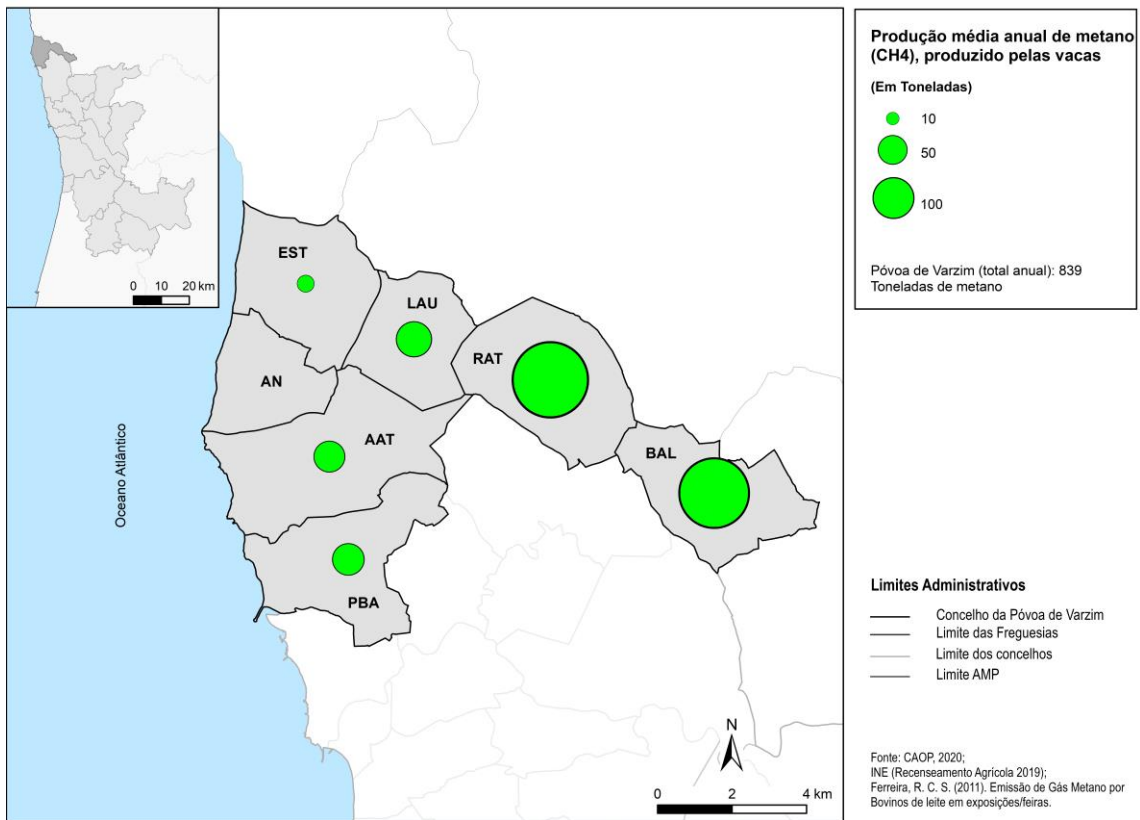


Figure 3: Average annual methane production by cows in Póvoa de Varzim

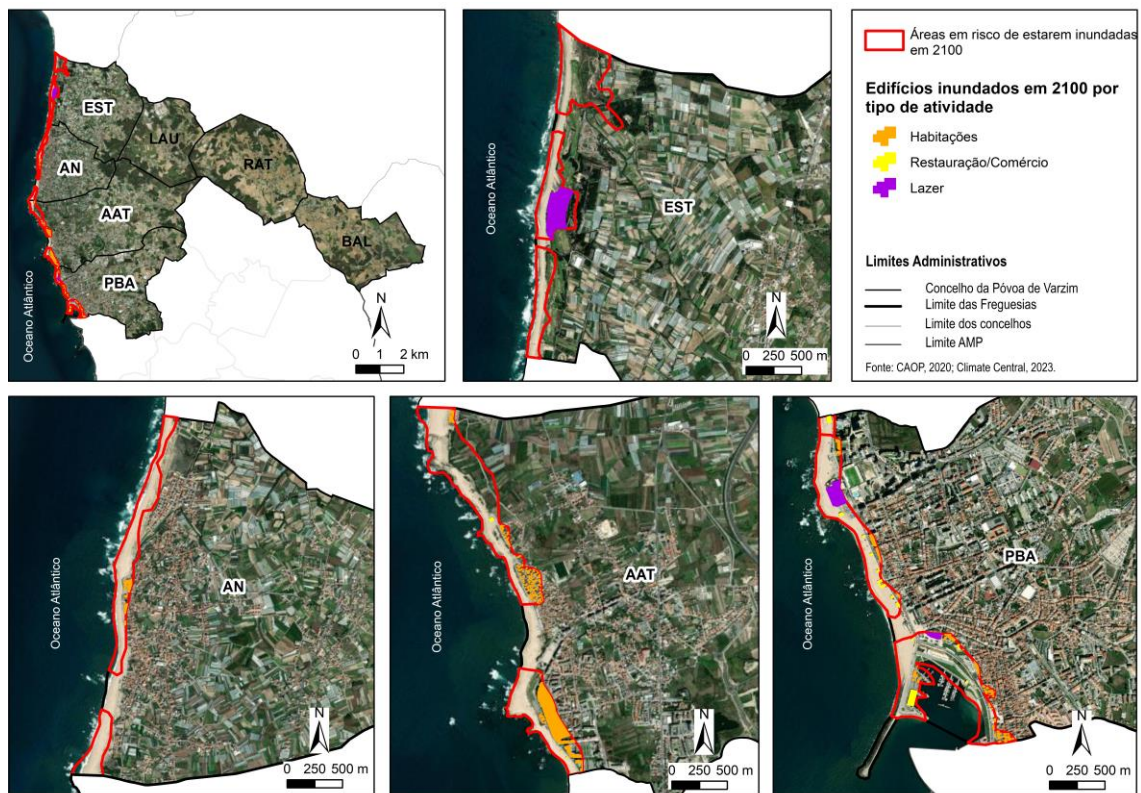


Figure 4: Losses by types of activity in 2100 in Póvoa de Varzim (if the worst-case scenario materializes)

21487 | Contrastive Analysis of the translations of Chapter XVII of Harry Potter and the philosopher's stone into European Portuguese and Brazilian Portuguese

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The present paper aims to identify some of the linguistic differences in the European Portuguese and Brazilian Portuguese versions of the chapter XVII of Harry Potter and the Philosopher's Stone by J. K. Rowling. The method used is contrastive analysis which consists of contrasting the two varieties of the Portuguese language. This kind of approach is used to facilitate the translation process by identifying the differences between structures and expressions of the languages involved. The obtained results are mainly of lexical, orthographic, and syntactic nature. It is confirmed that, even though, European Portuguese and Brazilian Portuguese are two varieties of the same language, they are still notoriously different and that is necessary to be aware of those differences and to know the two varieties in order to avoid linguistic discrimination. It is important to know the linguistic and grammatical characteristics of the varieties of both the source and target text to avoid misinterpretation, spelling mistakes, and linguistic errors. In conclusion, an excellent adaptation or translation happens when the translator is not only an expert in the source language, but also dominates the target language.

Keywords: Contrastive Analysis, Linguistic Adaptation, Variation, European Portuguese, Brazilian Portuguese.

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Background & Aim: This study investigates the impact of graphic design on textual relations in the book *Cassandra*, considering the act of reading as a necessarily visual affair. The aim is to analyze how elements of textual design update and expand on the written texts, which were produced without the posthumous design in mind. **Methods:** Various texts from "Cassandra" are analyzed, including Mickael de Oliveira's "4 Lições para a Sobrevivência" and Marta Freitas' "Operação Cassandra", in order to identify and problematize the diverse design strategies employed. **Results:** Graphic design elements such as scale play and text concealment/displacement significantly contribute to thematic nuances and narrative information, effectively enhancing the original text and often adding entirely new narrative information. **Conclusions:** The findings highlight the visual possibilities of text as well as the design component's imagetic contribution to textual interpretation, challenging the way we look at and read written text, as well as problematizing the several ways in which it can be presented. We conclude the text's presentation to be a defining factor in how one engages with textual information, similar to vanguardist experimentalist trends in literature.

Keywords: Design, Text, Image, Experimentalism, Literature.

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21580 | Sex workers' experiences and representations of public space in the city of Porto: an ethnographic approach

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Background & Aim: This dissertation, supervised by the Professor Dr. Lígia Ferro, aims to analyze the experiences and representations of public space by street sex workers in the city of Porto. Sex work is part of a vast universe of dissimilar explanations and representations that conflict with each other, given that this activity is "simultaneously recognized and relegated (...). It is legal but not recognized, tolerated but disapproved " (Oliveira, 2001:72). In this manner, the central objective is to understand the subjective meanings, sense of belonging, experiences and perceptions of street sex workers in relation to the urban spaces associated with the practice of street prostitution, with the aim of exploring the transformations of public space based on the social representations of these subjects. Thus, we can see that human practice, namely street sex work, plays a central role in the production and use of public spaces, giving it new meanings. It is therefore imperative to analyze the impact of sex work in these contexts, exploring how this practice influences social norms, power relations in society, as well as the very morphology of urban areas within cities. In pursuing the objectives outlined, this study aims to both expand scholarly knowledge and provoke critical reflection, thereby paving the way for future research endeavors to delve deeper into the complexity of urban experiences. **Methods:** This research employs a qualitative methodology rooted in the constructivist paradigm, with a focus on comprehending the subjective meanings individuals develop in society (Creswell, 2009:26). Ethnography is utilized as the primary data collection technique, enabling interpretative and holistic analysis through participant observation. **Results and conclusions:** This dissertation is not yet been finalized, as both results and prospective conclusions are still in the process of being gathered. Nevertheless, in the ensuing months, there will be preliminary findings to be unveiled.

Keywords: Sex Workers, Public Space, Social Representations, Subjective Meanings.

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21597 | Female Monasticism in Portugal in the Middle Ages: historiographical and literary representations

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Frei Luis de Sousa and Frei Lucas de Santa Catarina had the responsibility to make the memoir of the founder of Ordem de Pregadores, S. Domingos de Gusmão, and his successors. Through the analysis of their religious chronicle, História de S. Domingos, a modern text (1623-1733), the goal is to carry out a survey of historiographical and literary representations, giving us an idea of the true female monasticism practiced during the Middle Ages.

The representations can be histories of the creation of the Order-inspiring ones, but with a propaganda objective-involving nuns in the convents, spaces where they could read and discuss spirituality, always with the guidance of a male. So, we question if there existed a specific female spirituality, how it was practiced in the Dominican cloisters, attending to the imposed limitations of the guides, and the learnings they had in writing and reading.

Some writing elements can help us differentiate between genders. In that sense, the reading process must be detailed, attending to the details of the differences in the vocabulary that the chroniclers use to describe the male or female enclosure. That's the reason for the importance given to the literary character of the investigation.

The chronicle that we are working with, is a modern source, but the project is focused on female monasticism in the Middle Ages. Thus, the data will be focused on the medieval, helping to understand how this universe had an influence on the chronicle and the time it was written, as well as the correlation to the religious politics practiced then.

Keywords: Middle Ages, Monasticism, Female, Spirituality, Literature.

21652 | Desire and Fashion Photography: Helmut Newton's Representation of Women

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Background & Aim: This work aims to expose how the female body is represented in fashion photography, with the intent to elicit desire, delving into how the photographer Helmut Newton portrays women, particularly how he sexualizes them, highlighting the fetishization of the body and also seeking to convey the various interpretations that his work has according to feminist principles. **Methods:** Based on the concepts of "photography" and "desire" the research began with a study of photographer's power in manipulating viewer's desire, which led to fashion photography, a genre that utilizes bodies and advertised objects to provoke the impulses of buyers, with marketing being an important sphere to consider. I then started by studying general works on photography that introduced me to concepts, such as 'male gaze', which allowed me to start researching through keywords, and finally select Newton as an example to be given in this field. The samples that were used to examine this subject were four of Newton's creations within the timeframe of 1970-1989, which were analyzed considering the relationship between photographer and subject, within a voyeuristic framework, as well as technical aspects (light, framing, camera position). **Results:** Despite several interpretations stating Helmut's art as feminist for reversing women's role, after this analysis it's clear that Newton's camera, as a symbol of gaze, establishes, in the four cases, a power dynamic between the male gaze and the female vision, reflecting the gender hierarchy in fashion photography, nonetheless it being undeniable the protagonism given to women. **Conclusions:** Newton's work was undoubtedly revolutionary, representing women in an innovative way that took advantage of their image of independence to create sexual provocations. Subverting the function of fashion photography, he made the use of sexuality to sell clothes the norm and presented a new perspective of women, portraying them with a dominant attitude, yet still submissive to the desires of men.

Keywords: Photography, Feminism, Helmut Newton, Fashion.

Acknowledgments

This work was oriented by Professor Nuno Resende within the course of History of Photography.

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21657 | In the Weave of Time: Are Archaeological Textiles and Hides the Silent

Witnesses of History?

Catarina Almeida¹; José Alves ¹; Lucas Avello¹; Ana Calzavara¹; Alexandra Camacho¹; Duarte Faria¹; Gabriel Forte¹; Vítor Gomes¹; Dora Henequin¹; Filipe Machado¹; Luís Marques¹; César Martins¹; Mariana Moreira¹; Carlos Rocha¹; Daniela Ferreira^{1,2}

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Background & Aim: Rarely preserved in archaeological contexts, remnants of textiles, fibers, cordage, leather, and other perishables present challenges for identification through conventional excavation and exhumation methods [1,2,3]. Despite their susceptibility, these remnants play a pivotal role in reconstructing historical narratives. Their absence leaves a void in our comprehension of history, as they offer unique insights into various aspects of material culture, particularly clothing and tapestry. In Portugal, archaeological campaigns seldom integrate procedures specifically designed for identifying such remnants in excavated contexts. In contrast, international projects have developed and incorporated methodologies that significantly enhance this process, analyzing specific components of former objects, chemically degraded pseudomorphs [4] or even traces preserved in soil [5,6]. This project aims to contribute to the development of a manual offering detailed recommendations for the identification, exhumation, and conservation of perishables remnants. **Methods:** Developed by students pursuing their bachelor's degree in Archaeology, this manual is the outcome of an exhaustive documentation of the technical aspects related these objects and encompasses significant developments that have taken place over the past two decades in this field of study. **Results:** Through collaboration with ongoing archaeological research projects, the proposed recommendations will be implemented during an excavation campaign scheduled to take place in the north of Portugal in July 2024. Following the fieldwork, the results will be meticulously analyzed to assess the effectiveness of the proposed methodologies. **Conclusions:** This study holds profound significance as it not only endeavors to revive a neglected facet of heritage but also contributes to a deeper understanding of the past. Through the identification and study of these remnants, we enhance our historical knowledge, bringing to light a valuable yet often overlooked cultural heritage.

Keywords: Archaeology, Perishables, Textiles, fiber Analysis, Hides.

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21701 | Chapels and the religious expression of communities, the case study of the parish of São Martinho de Argoncilhe

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Background & Aim: In the context of religious expression in Portugal, chapels have emerged as spaces for worship, bringing communities together and motivating collective and individual practices. The aim of this work is to observe this reality through a local example, understanding the dynamics of a community around a set of chapels. The study focuses on the parish of *São Martinho de Argoncilhe*, in *Santa Maria da Feira*, and the four chapels that existed there in the modern period: the Chapel of *Nossa Senhora das Neves* and the Chapel of *Nossa Senhora do Campo*, under the ownership of the *Mosteiro de Grijó*, and the chapels of *Santo António* and *Nossa Senhora da Assunção*, both under private ownership. **Methods:** The methodology used focuses on cross-referencing descriptions of the four chapels using a long-term approach defined by the documentary sources. These are the *Crónica do Mosteiro de Grijó* (1634), the *Santuário Mariano* (1707-1723), and the *Memórias Paroquiais* (1758). The analysis of the buildings is essential, since three of the four chapels under study still exist. This allows us to present some answers that allows us to recognize the expressions of identity that characterize the heritage value conferred on these spaces nowadays. **Results:** Thus, it has been possible to understand their relevance to the community, not only as places where individuals practice their faith but also as distinctive elements for those who owned a chapel. The two private chapels appear to be connected with individuals in privileged economic situations, also serving to reinforce their social status. These descriptions also allow us to observe examples of material and immaterial forms of worship, such as festivities, processions, and holy objects, some of which date from the 18th century. **Conclusions:** These standpoints allow us to observe the religious expression of the community, revealing the potential of studying the chapels and the dynamics surrounding them.

Keywords: Chapels, Communities, Religious Expression, Argoncilhe (Santa Maria Da Feira), Local History.

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21794 | Revisiting a Greek Vase in Portugal

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This research of the Greek Lekanis vase (end 4th c BCE, produced in Apulia, former Magna Graecia) is the result of several research projects by Prof Dr Maria Helena de Almeida da Rocha, a pioneer in the study of Greek vases in Portugal. We aim to analyse and characterise the vase from the point of view of its practical usefulness, decoration and iconography, looking at it from the perspective of its direct relationship with architecture. To carry out this work, we began an in-depth bibliographical search, which was selected and organised according to how up-to-date it was, in comparison with the observation of the vase. This vase is part of a private collection of Greek vases, which was studied and exhibited at the Abade de Pedrosa Municipal Museum in Santo Tirso, Portugal, in 2008. Attempts were made to view and photograph the vase but, contrary to our expectations, were unsuccessful. This was followed by a formal, ornamental and iconographic analysis, in a contextualisation with classical Greek architecture. This investigation produced visual and formal results of the piece and its usefulness. The vase was related to its surroundings, framed and updated from the triple Vitruvian concept of *Firmitas, Vtilitas and Venustas*. This Lekanis vase, in addition to its historical, cultural and artistic relevance, also has the plastic capacity to incorporate the present and contemporary times from new References: such as the design perspective.

Keywords: Lekanis, Greek Vases in Portugal, Vitruvius, Architecture, Design.

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21805 | A Comparative Analysis between the Northern Region of Portugal and Champagne-Ardenne, France

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Background & Aim: Innovation and research are critical for territories' economic and sustainable development, especially in pursuing a smarter Europe [1, 2, 3]. This study aims to make a comparative analysis examining the Northern Region of Portugal (NRPort) and the Champagne-Ardenne Region (CARFr), France, in the context of implementing the Smart Specialization Strategy (S3) and monitoring progress towards the Sustainable Development Goals (SDGs) – 2030 Agenda/UN. **Methods:** We characterized two regions with a distance index of 0.0301 [4], highlighting the main areas of activity and projects of the Regional Smart Specialization Strategy (2014-2020). To monitor the progress of SDGs, we analyzed data for periods of five years, calculating evolutionary trends for both regions. **Results:** Both regions are aligned with the Innovation-Knowledge-Learning theory [5], accentuating the role of innovation and learning in fostering sustainable economic growth. The NRPort prioritizes sectors such as marine technologies, health and advanced manufacturing. Notable projects include the Campanhã Intermodal Terminal, aiming to improve urban connectivity. In CARFr, priorities encompass health, energy management, and sustainable agriculture. The analysis of SDG trends indicates progress in areas such as education, gender equality and employment, although there are variations between regions (Fig. 1). Advances have been accomplished in promoting tertiary education in 11.9% of the NRPort and only 2.2% of CARFr from 2017 to 2022. However, both regions showed a 1.3% and 1.6% reduction, respectively, in the gender employment gap. **Conclusions:** This comparative analysis provides a framework of the region's similarities, common challenges and particularities that can be potentiated and focused on public policies, guiding the European Union towards a smarter and more inclusive Europe. Many challenges remain in fostering innovation and sustainability, which emphasizes the need for constant monitoring and research.

Keywords: Smart Specialization, Sustainable Development, Public Policies, Innovation, European Union.

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Goals	Indicators	Period	Region (NUTS 2)			
			Norte		Champagne-Ardenne	
			Evolution	Trend	Evolution	Trend
SDG 4 – Quality Education	Population, between 25 and 34, with tertiary education	2017-2022	11.9%	↑	2.2%	↘
	Early leavers from education and training (between 18 and 24 years old)	2017-2022	-7.9%	↑	-0.9%	↘
SDG 5 – Gender equality	Gender employment gap	2017-2022	-1.3%	↗	-1.6%	↗
SDG 8 – Decent work and economic growth	Young people neither in employment nor in education and training	2017-2022	-3.1%	↑	-4.2%	↑
SDG 9 – Industry, innovation and infrastructure	Gross domestic expenditure on R&D (higher education sector)	2016-2021	0.42%	↓	N/A	N/A
SDG 11 – Sustainable cities and communities	Road traffic deaths (per 100 000 people)	2016-2021	10	↓	-4	↘

Figure 1: Evolutionary trends of Sustainable Development Goals Indicators, for the North and Champagne-Ardenne regions. Source: Own elaboration based on Eurostat data, 2023. (ⁱ N/A – Not available)

21823 | The New Cold War: how the development of sub-development influenced the relations between Iran and Saudi Arabia

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Background & Aim: Amid tensions in the Middle East, the relations between Iran and Saudi Arabia have been studied from the perspectives of Realism and Constructivism. To understand what is often referred to as the “New Cold War,” this article explores a different angle by applying the Dependency Theory. **Methods:** Starting our analysis with the Arab Spring, we focus on the period from 2011 to 2023 and base our research on content discourse analysis of speeches and official statements given by key political actors and news from online newspapers to shed light on how historical sub-development has shaped the diplomacy of both states. **Results:** The analysis shows that the conflict between Iran and Saudi Arabia and tensions in the area derive from a past marked by colonization and the state’s desire to be perceived as legitimate actors. **Conclusions:** This article shows the importance of past exploitation in recurring conflicts and diplomacy. It also reflects on how historical sub-development shaped states' self-perspectives and priorities. We hope to draw attention to the lack of research in this area and start trying to find other solutions to the difficulties associated with historical sub-development.

Keywords: Iran, Saudi Arabia, Dependency Theory, Regional Hegemony.

21844 | A study on the coastal potholes of Praia do Castelo do Queijo

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Background & Aim: Castelo do Queijo beach is a notable coastal relief in the city of Porto due to its remarkable geological diversity. The objective is to analyse the spatial distribution and characteristics of coastal potholes in this area, as well as to examine the factors that explain their distribution and the areas in which they are concentrated. To do this, we will identify and outline its dimensions, orientation, diameter and shape, which comprises coastal potholes of different dimensions and different geometries. **Methods:** As part of the work approach, three visits to the research area were made to detect the potholes and measure them (fig. 1 and 2). We use a variety of applications, such as Excel, ArcGis, Weather Underground, Google Earth, and Google Maps, in addition to reading scientific publications. Additionally, the correlation between width and depth as well as between diameter and depth was determined in order to further analyse the potholes and the correlation between measurement parameters. Towards this aim, the trend line and the R factor were computed to verify the presence of correlation and allocate this coefficient to one of the subsequent categories: Perfect correlation is shown by $R=1$, strong correlation by >0.8 , moderate correlation by $0.4-0.7$, and weak correlation by <0.3 . **Results:** This enables us to affirm that coastal potholes are present in every studied region, with the majority of them concentrated in the northern part. It was possible to confirm their relationship using the obtained data, and it was determined that there is a moderate correlation between depth and diameter with a correlation coefficient of $R=0.548$, indicating a moderate correlation (fig. 3). **Conclusions:** Based on the data and bibliographic research, we can conclude that the "standard" found in the potholes in the study sector is congruent with the theories developed during the investigation.

Keywords: Coastal Potholes, Morphometry, Erosion, Lithology.

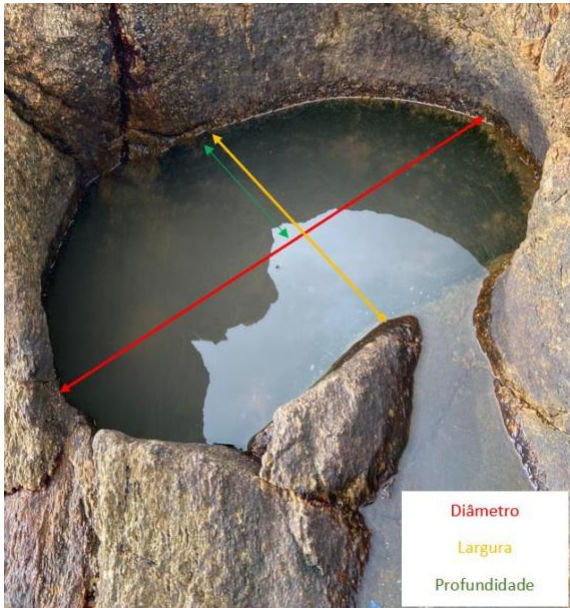


Figure 1: Parameters for measurement

Formação geológica	Latitude	Longitude	Formato	Diâmetro (cm)	Largura (cm)	Profundidade (cm)	Orientação	Nº rochas	Tipos de rochas
Marmita 1	41°10'1.85"N	8°41'25.36"W	Circular	58 cm	48 cm	16,5 cm	SO - ONE	-	-
Marmita 2	41° 9'52.73"N	8°41'17.48"W	Circular	92 cm	52 cm	32 cm	ONE - OSO	1,00	Granito
Marmita 3	41° 9'51.12"N	8°41'15.20"W	Multiforme	230	320,00	37,00	E - O	9,00	Granito; Xisto
Marmita 4	41° 9'50.81"N	8°41'15.56"W	Multiforme	113	108	13	ENE - WSW	60,00	Granito; Xisto
Marmita 5	41°10'1.89"N	8°41'27.27"W	Multiforme	165,00	70,00	80,00	N - S	-	-
Marmita 6	41°10'1.58"N	8°41'26.49"W	Multiforme	310,00	150,00	62,00	NE - SE	-	-
Marmita 7	41°10'2.26"N	8°41'26.68"W	Multiforme	138,00	90,00	30,00	NE - SO	-	-
Marmita 8	41°10'1.77"N	8°41'27.11"W	Subcircular	103,00	81,00	30,00	N - S	-	-
Marmita 9	41°10'1.60"N	8°41'26.70"W	Circular	160,00	98,00	22,00	NNE - SSW	-	-
Marmita 10	41°10'2.03"N	8°41'26.99"W	Multiforme	102,00	200	49,00	NE - SW	-	-
Marmita 11	41°10'1.84"N	8°41'26.84"W	Multiforme	103,00	97,00	56,00	N - S	-	-
Marmita 12	41°10'1.83"N	8°41'26.57"W	Circular	144,00	125,00	66,00	NE - SO	-	-
Marmita 13	41°10'2.49"N	8°41'27.04"W	Multiforme	127,00	165,00	36,00	NE - SO	Sedimentos	Arenito
Marmita 14	41°10'0.29"N	8°41'24.33"W	Subcircular	100,00	287,00	30,00	SE - NO	Sedimentos	Arenito; Granito
Marmita 15	41°10'0.16"N	8°41'24.51"W	Subcircular	42,00	31,00	20,00	N-S	Areia	Areia
Marmita 16	41°10'0.07"N	8°41'24.28"W	Subcircular	252,00	118,00	57,00	N - S	30,00	Xistos; Basaltos
Marmita 17	41°10'0.01"N	8°41'24.67"W	Subcircular	68,00	59,00	37,00	NNO - SSE	-	-
Marmita 18	41° 9'59.96"N	8°41'24.42"W	Subcircular	75,00	53,00	20,00	NNW - SSE	-	-
Marmita 19	41° 9'55.38"N	8°41'18.69"W	Subcircular	61,00	53,00	30,00	ENE - WSW	+/- 22	Granito; Xisto;

Figure 2: Data collected in fieldwork

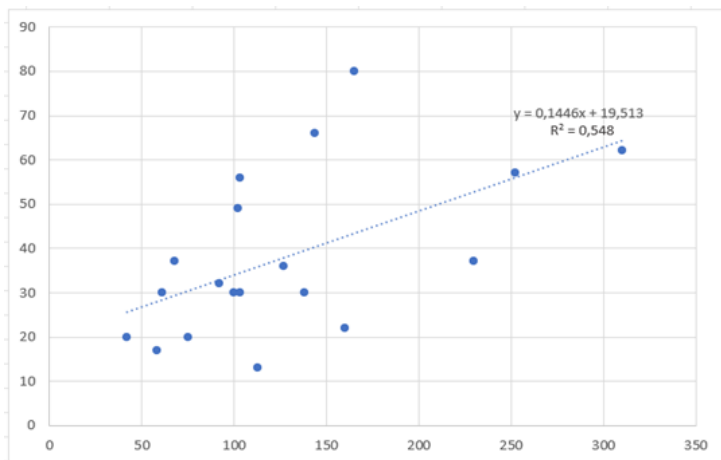


Figure 3: Correlation between diameter and depth

21903 | Natália Correia and the Feminism Mystique – Reception and Intermediality of the medieval tradition

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Natália Correia, a crucial writer and intellectual of the 20th century, contributed largely to the politics and culture of her time, based on studies by Joaquim Flora on the feminine utopia of the age of Holy Spirit [1]. In this way, framing the figure of women as central, it deeply questions the staleness of the language and moves away from the patriarchal dogma of a culture stagnated by the Estado Novo. To this end, Natália investigates the intellectual achievements of medieval times and makes them the yardstick for a modern sensibility. The author thus risks bringing to light the truth of a stuck and repressed society, as in the case of the *Antologia de Poesia Portuguesa Erótica e Satírica* (1965). Based on the thesis of feminine mystique, this work focuses on the study of Natália Correia's reception and intermediality of the practice of amor cortês in the Galician-Portuguese tradition and, also, the remote origins of cantigas de amigo. To this end, I will summarize the author's corpus, where I will focus on the introductory notes to *Cantares dos Trovadores Galego-Portugueses* (1970), highlighting Natália's thesis in relation to the psychosociological motivation of the troubadours. In this way, the cantigas would correspond to asceticism, a renunciation of the conception of sin that the dogma of the Greco-Christian tradition adds and that Natália considers the disfigurement of man's individuality. The album *Cantigas d'Amigos* (1971), written by Amália Rodrigues and co-authored with Natália Correia and Ary dos Santos, is an example of the spread of the approach to feminine mystique from literature to new media. According to Irina O. Rajewsky, this album corresponds to a medial constellation [2], as it recovers the three means of troubadour culture: literature, music and illuminations. Therefore, it is urgent to analyze Natália Correia's thesis and how this cult of the feminine, brought from medieval times to the 20th century, lead to a response to the patriarchy.

Keywords: Intermediality, Reception, Feminism Mystique.

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21926 | Are animals conscious? Is perception an answer to the problem of animal consciousness?

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Background & Aim: Do animals have consciousness? What degree of consciousness is it? This problem is linked to our moral responsibility towards other species. It is also relevant to discuss this problem without considering the issues that have influenced it, such as cartesian dualism and theology. **Methods:** We have clear perceptions of consciousness when we interact with animals, the problem arises when we ask ourselves whether these perceptions have enough epistemological value. Perceptualism will be the base theory for answering to these questions. **Results:** It will be defended that the epistemological value of perception is sufficiently valid to act as proof of animal consciousness. **Conclusions:** The perception of consciousness is empirically phenomenon too powerful to ignore, this would set many precedents about the way we view the facts received by perception for it to still be coherent to do so. It is therefore clear that at least some animals are conscious and why and how perception is sufficient to prove their consciousness.

Keywords: Animals' Consciousness, Animals Minds, Perceptualism.

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21955 | Love and Rejection in Maternity and Mothering: Portraits of Violence

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Background & Aim: This study examines violence against women in the context of maternity in Carla Madeira's novels *Véspera* (2021) and *Tudo é rio* (2021), analyzing the experiences of characters Vedina and Dalva, who face maternal challenges amid partner violence, exploring how this impacts their roles as mothers and diverges from societal norms. **Methods:** Violence against women, as defined by the United Nations (1995), includes gender-based acts resulting in physical, sexual, or psychological harm. This form of violence has permeated women's lives and existence since ancient times, with women being denied the principles of citizenship, barred from participating in political life, perceived as reproducers, incapable, frail, submissive and even blamed for the violence they suffered (and still suffer). Moreover, historical, and institutional factors perpetuate this violence, rooted in patriarchal systems, denying women autonomy over their bodies, affecting mothering experiences. **Results:** According to [1] maternal bonding is influenced by societal context and personal experiences, therefore, Vedina and Dalva respond differently to maternal violence. Vedina's abandonment of her child stems from past trauma and the compulsion to repeat painful experiences. Conversely, Dalva nurtures her children despite abuse, drawing from her positive upbringing. **Conclusions:** This analysis illuminates the socio-psychological dynamics of maternal violence in the novels, highlighting its profound impact on maternal relationships. By exploring these themes, this study contributes to discourse on Brazilian literature, gender, and the complexities of mothering amid violence.

Keywords: Feminism, Violence, Maternity, Mothering, Brazilian Contemporary Literature.

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21958 | An analysis of student electoral dynamics in FLUP and FCUP in relation to the elections to the faculty bodies, General Board and Students' Associations

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Background & Aim: There is a gap in Portuguese electoral sociology: the analysis of electoral dynamics in higher education institutions. Even in an international panorama, there are very few studies that focus on understanding how students participate in the democratic aspects of their universities. An example of one close in spirit to what is intended in this work was carried out in 2009 in Australia in secondary schools (Saha & Print, 2010). In Portugal there are some works on the importance of student dynamics through Political Sciences (Seixas, 2005) and Education Sciences (Oliveira, 2021; Sousa, 2019). What we aim to do is explore student participation in the last two decades at FLUP and FCUP, trying to understand: the role of plurality in mobilization; the importance of the electoral program; the difference in participation between elections for different bodies; as well as whether these conclusions are the same for both faculties. **Methods:** The study is based on a collection of data from participation and results about the electoral moments mentioned, from which we will try to find the correlations. The issue of the importance of the electoral program will be addressed in light of the 2023 election for the Council of Representatives at FLUP: one of the candidate lists was constructed for this purpose, without campaigning or publicizing the program (the ethics involved are discussed in this work). **Results:** The «ghost» list received 12% of the vote, however it is still necessary to further explore the data. **Conclusions:** Considering the importance of internal democracy in higher education institutions, the fact that students constitute a group of citizens who should be particularly informed and active, that students are already voters, it will be important for new studies in electoral sociology to take a look inside universities and polytechnics, better understanding the democratic logic of Portuguese voters.

Keywords: Elections, Higher Education, Students' Participation.

Acknowledgments

I thank those who allowed the candidate list to exist: Vitória, Nuno, Sandra, Mateus, Matilde, Miguel and Inês. I would also like to thank all those who kindly provided me with the data.

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21971 | The Tchiloli of São Tomé and Príncipe

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Background & Aim: Contemporary scientific inquiry into São Tomé's Tchiloli predominantly delves into its historical trajectory and intricate portrayal. My aim in this work is not only to elucidate its history, but also to emphasize its fundamental role in safeguarding and perpetuating São Tomé's cultural identity as well as to show its syncretic essence. **Methods:** In order to carry out this work, videos were watched and analyzed, as well as relevant and recognized scientific books and articles in the field. This approach meant to provide a robust and multidisciplinary analysis of this theatrical expression. **Results:** It was recognized that Tchiloli is a popular theatre in which the dimensions of ancestor worship, the importance of family and collectivity, the limited participation of women, the heredity of roles and resistance to colonial oppression are present. But also that Tchiloli's greatest importance lies in the fact that it was a weapon, that it quickly ceased to be about Emperor Carloto and the Marquis of Mantua, and came to signify the emancipation of a people with a strong cultural identity at a time of oppression, and which would end up being a harbinger of the triumph of independence and justice that was to come and which would finally be fulfilled. **Conclusions:** Tchiloli is a reflection of history and also of the identity of São Tomé, an identity of encounters. The encounter of European and São Tomé's culture of colonization and resistance, of the past with the present, of theatre with popular tradition, of competition and solidarity, of the cult of the ancestors with the conviviality of the living, of the lack of female participation with active male participation in the spotlight, of movements and music.

Keywords: Cultural Heritage, Popular Theatre, Acculturation.

22019 | Dance as a Cultural Expression in the History of Portuguese Art

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Background & Aim: The history of dance in Portugal has always been present in the country's culture but has not yet received the attention it deserves. It is imperative to analyse the history of dance in Portugal in detail, as it has not been neglected, contrary to popular belief, but has followed distinct and authentic paths, becoming part of Portugal's national cultural identity. With experience in dance in art education and now in art history, I have the background to cross these two areas. The aim is to demythologise the art of dance in the 16th and 17th centuries, which, unlike poetry and music, only achieved recognised artistic status with the advent of the Renaissance. The three areas are usually united, but here they will be mostly broken down, keeping dance contextualised in its social and cultural environment. **Methods:** Analysing works on the history of dance, starting with J. Sasportes and his works "História da Dança" [1] and "História da Dança em Portugal" [2] and continuing with Daniel Tércio, Catarina Silva and Sónia Duarte [3,4], who study dance in Portugal through visual and documentary sources such as treatises, inquisitorial processes [4,5] and iconography [6], will allow us to trace a path through the artistic expression of the Baroque. **Results:** It is known that Western Europe went through the desacralisation of dance and progressive investment in theatrical forms, replacing ritualistic practices. In Portugal, this desacralisation was the work of the church, with the court playing a role in the methodology. However, in distinction to the rest, there was resistance to the neutralisation of dance's powers. The Portuguese resisted, keeping the dance alive through attempts at international framing, preserving its authenticity with poetry and images from the songbooks. **Conclusions:** Portugal safeguarded its unique dance by ensuring that it remained a distinct reflection of its cultural identity during ecclesiastical norms.

Keywords: Portugal, Baroque, History of Dance, Ballets.

Acknowledgments

Thank you to my teacher, Sonia Duarte, for making me aware of and motivating me to explore this subject and the world of dance that I love so much.

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Figure 1: Assumption (detail), Francisco de Campos, Sanctuary of the Good News, 1565-70



Figure 2: Drawing "Musiciens de campagne, neuf figures". Album Daniel Rabel, INV. 32604 (Taken from Costa,2016-2020)



Figure 3: Drawing "Entrée des Espanols, huit figures". Album Daniel Rabel, INV. 32646. (Taken from Costa,2016-2020)

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Processo de Lourenço Pereira cristão novo
mestre de dança solteiro filho de João Pereira
mercador já defunto natural e morador da
cidade do Porto preso nos cárceres da
Inquisição de Coimbra

Figure 4: ANTT, "Processo de Lourenço Pereira, cristão-novo e mestre de dança", Tribunal of the Holy Office, Inquisition of Coimbra, proc. 4408, 1660-64

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Background & Aim: This study aims to investigate the temporal relationships that are established between the events that comprise news lead. The following specific objectives have been established: (i) to identify and characterise the events that occur in the news lead; (ii) to determine the temporal relations established between the events; (iii) to assess the presence or absence of temporal succession. **Methods:** We used a corpus consisting of thirty news items, annotated and analysed using the BRAT tool [4]. These news stories are part of a dataset [1], built in the context of the project *Text2Story: Extracting journalistic narratives from text and representing them in a narrative modelling language* and formed by 358 news stories from Lusa news agency, written in European Portuguese and published between October and December 2020. The annotation process followed the proposal of some of the labels and attributes of the annotation scheme proposed by Silvano *et al.* [3], specifically the part related to time and events. **Results:** The results show that in the thirty leads annotated and analyzed there are 128 events and 95 temporal relations, with an average of 4.27 events and 3.17 temporal relations per lead. Regarding the number of words, there is an average of 33.73 per lead, in line with Lusa's guidelines [2]. A total of 56 nouns, 55 verbs, 11 adjectives, and four prepositions are registered. The temporal relations established between the events are BEFORE, INCLUDES, IDENTITY, SIMULTANEOUS, AFTER, IS_INCLUDED and BEGUN_BY (in order of frequency). **Conclusions:** We can conclude that the events are predominantly represented by nouns and verbs, although there are some occurrences of adjectives and pronouns. The verbs are mostly in the simple past tense and have a perfective aspect. Regarding temporal relations, the two most frequent are those of anteriority and inclusion, followed by those of identity and simultaneity. It can be said that there is no temporal succession in news leads.

Keywords: Temporal Structure, Temporal Relations Between Events, Annotation, News Corpus.

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	<i>Lead</i>	<i>Events</i>	<i>TLINKs</i>
<i>Total</i>	30	128	95
<i>Average</i>	33,73 (words/lead)	4,27 (events/lead)	3,17 (TLINKs/lead)
<i>Maximum value</i>	40	7	6
<i>Minimum value</i>	25	1	0

Table 1. Statistical data on the analysed leads, their events and the temporal relations established.

<i>Attributes</i>			<i>Number of occurrences</i>
<i>Events</i>	pos	VERB	55
		NOUN	56
		ADJECTIVE	11
		PREPOSITION	4
	tense	PRESENT	5
		PAST	42
		FUTURE	0
		IMPERFECT	1
	aspect	PROGRESSIVE	0
		PERFECTIVE	48
		IMPERFECTIVE	1
		PERFECTIVE-PROGRESSIVE	0
	IMPERFECTIVE-PROGRESSIVE	0	
<i>TLINKs</i>	BEFORE	22	
	AFTER	8	
	INCLUDES	22	
	IS_INCLUDED	7	
	DURING	0	
	SIMULTANEOUS	15	
	IDENTITY	19	
	BEGINS	0	
	ENDS	0	
	BEGUN_BY	2	
	ENDED_BY	0	

Table 2. Number of occurrences of the attributes of the events and temporal relations analysed.

Figure 1: Tables on statistical data and number of occurrences.

22072 | Adaptation or accentuation of urban heat islands (?): 72 points between Santo Ildefonso and Bonfim (Porto)

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The urban climate of a city is shaped by a plethora of factors rooted in environmental interventions and anthropism, where careless urban planning can generate externalities such as urban heat islands. Therefore, tree planting along the streets has solidified its position in recent years as one of the main measures to adapt to this issue, potentially reducing temperatures by around 3°C, increasing humidity by 10 to 20% (Valença, 2020), as well as decreasing the level of air pollution, simultaneously enhancing the quality of life of its residents. In the city of Porto, where these positive thermal anomalies generated by recent urbanization processes (and soil artificialization) and tourism are frequently recorded, it is increasingly imperative to consider the aforementioned aspects and incorporate them into territory planning processes. As part of the new PDM (Municipal Plan Director) of the city of Porto, XXI Zones were created with the aim of progressively eliminating parking in public spaces and along streets. Our work focused on XXI Zone 2 (Campo 24 de Agosto/Bolhão/Batalha), where we conducted itinerant measurements over three weeks of temperature and pollution values to determine which streets to plant trees on (or not). For this purpose, we chose to use Tiesto 454 equipment (for temperature measurement) and the Flow Plume (for measuring common air pollutants concentrations), subsequently employing statistical and cartographic methods, notably the 'kriging' tool, to process and analyze the obtained data. The results highlighted the effects of the city's increasing urbanization, with key points causing disruption, notably the effect of road traffic, cooling systems, urban lifestyles, and finally, the effects of tree planting. Nevertheless, in our view, a more comprehensive research effort over a longer period would be necessary to better understand the impacts that urbanization processes, and more recently, tourism, have on the climatic context of the city of Porto at the street level.

Keywords: Heat Islands, Tree Planting, Cities.

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22077 | The specificity of Portuguese in contrast to the learners' language

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This work aims to present some specific aspects of the Portuguese language that are challenges faced by Chinese speakers in the process of learning Portuguese as a foreign language (PLE). I discuss the selection and creation of teaching materials for PLE classes, the importance of teaching grammar and, specifically, the teaching of the conjunctive in PLE classes. I present some of the differences between Portuguese and Chinese that cause difficulties to Chinese students. I highlight the use of the conjunctive and the personal infinitive in the conjunctive position in some structures. I also compare on two units of PLE textbooks (one Chinese and the other Portuguese). I report on the planning and implementation of three didactic units of my internship which took place at the FLUP in a level B class (according to the Common European Framework of Reference for Languages) of a group of university students from Macau, proposing a didactic approach to structures with uses of the conjunctive and the infinitive, giving some comments and reflecting on aspects of the pedagogical process and the results obtained. Regarding the method of conducting this work, two surveys on the learning of the Portuguese language and the results of pedagogical internship classes were utilized. In conclusion, it is essential to emphasize the importance of creating a context to apply grammar rather than merely transmitting grammar rules and requesting their memorization, the gradual transition from simpler tasks to more complex ones is beneficial for students to progressively overcome challenges. This work may contribute to addressing the identified issues, enabling us as teachers to improve our understanding of the difficulties and challenges that students face. I also hope that this work draws attention to the need for the utilization of more inclusive methodologies that adapt to the characteristics and objectives of students and promote their sociocultural integration in the country whose language they are learning.

Keywords: Specificities of Portuguese, Portuguese as A Foreign Language (PLE), Conjunctive, Personal Infinitive, Chinese Learners.

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22107 | From Athens at the 5 century BC: Experiencing a Greek Vase in Porto by the lenses of Art History

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Background & Aim: The Athenian Greek Vase dated around the 500-450 BC that is currently located in the Natural History and Science Museum of the University of Porto (MHNC-UP) by the inventory number 020054 is the object of study of this work. The aim is to analyze this vase, a *lekythos* of black-figure, through the information already gathered by Portuguese studies, like its production center context, believed date of creation, anterior known museum location; alongside of the analysis of the decoration and iconography portrayed around its length, creating hypothesis and questioning the already existing texts interpretation of the scene represented. The scene presented allows the questioning of an architecture in which the development of said scene could have happened, the activity related to this physical space and the means that granted it to happen: the hippodrome, the horse or chariot race and the quadriga. The actual physical condition, the perception of the colors, the height, weight – knowledge not contained in the texts used as reference, neither available on the MHNC-UP requested database, but obtained through this study – were also examined and photographed during the meeting the vase field work. **Methods:** The analysis of the painted scene was made using the iconography method and the comparison of the reference texts. To measure the height a caliper rule was used, along with a pen and other means for size comparison. A weight scale existing in the MHNC-UP was the one utilized to discover the weight of the vase. To understand the details, photos were taken; the physical condition was analyzed by touching the object to allow a better visualization. **Results:** The study allowed discover more details about the vase, like its weight, explore the way to realize measurements and help questioning the hypothesis already existing and bring more ideas to the interpretation debate. Trough the visiting the art piece, existing doubts were answered, like the top part of the vase that had a plastic appearance, but was entirely painted in ceramic; or illusion impressions the fine lines on the bottom part produce, answered by the touch experience procedure. **Conclusions:** This work wants to bring awareness about the importance of each individual Greek vase and its particularity to the process of acquiring knowledge about Ancient Greece, Greek-Roman Art and the habits that belonged to the referred space and time period, that can be acquired by what is painted or by

the vase utility, that may also show the places where it was used. This way, a vase should be analyzed through its historic, artistic and utilitarian use for better understanding. To bring more interest and curiosity to the area, especially considering that the piece is now in possession of a nearby museum for those who live in the city of Porto, Portugal, and it makes the approximation of an otherwise far reality and the occurrence of a scientific study near the students of Porto possible.

Keywords: Vase, Art, History, Ancient Greece, Investigation.

Acknowledgments

I would like to express my deepest gratitude to and to my parents, to my professor Filomena Limão and to the curator Rita Gaspar. This endeavor was only possible because of them.

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Figure 1: Greek Vase, Natural History and Science Museum of the University of Porto (MHNC-UP), Porto (Portugal). MHNC-UP 020054. Leticia Dantas

22126 | Graphical Abstracts: A bridge between science and the public?

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Background & Aim: The scientific publication is the primary mode of knowledge dissemination since the 17th century, however, has seen little structural change since then. Nowadays, despite easier access to information, abundant misinformation challenges public understanding of science. The infographic-style graphical abstract (GAI) can be the key to minimize these challenges, offering reliable information in a more engaging way. While all types of graphical abstracts visually represent the main points of a scientific study, GAIs are specifically designed for non-specialized audiences, making them more accessible. Nevertheless, there is limited data available on the true impact on the public of introducing GAIs in scientific articles. This research aims to evaluate the effectiveness of GAIs in engaging non-specialist audiences with science, highlighting imagery as an important language of accessible science. **Methods:** Considering the financial and human resources involved in implementing GAIs in scientific articles, we intend to assess potential significant differences in public interest and understanding when exposed to a GAI versus a textual abstract through a comparative study, based on the implementation of a questionnaire. To this purpose 3 graphical abstract were designed and integrated in the questionnaire. **Results:** If confirmed, we will determine concrete advantages for science communicators, researchers and even decision-makers in scientific journals to decide to include GAIs in their articles. This study is part of a master's thesis and is currently in the data collection phase. It is expected that the results will be available for analysis and conclusions at the time of presenting the poster. **Conclusions:** We anticipate that our study will yield supportive results on the advantages of integrating GAIs into scientific articles, as well as utilizing these GAIs for disseminating information on digital platforms, particularly in social media, where non-specialists are highly active.

Keywords: Science Communication, Graphical Abstract, Impact Evaluation.

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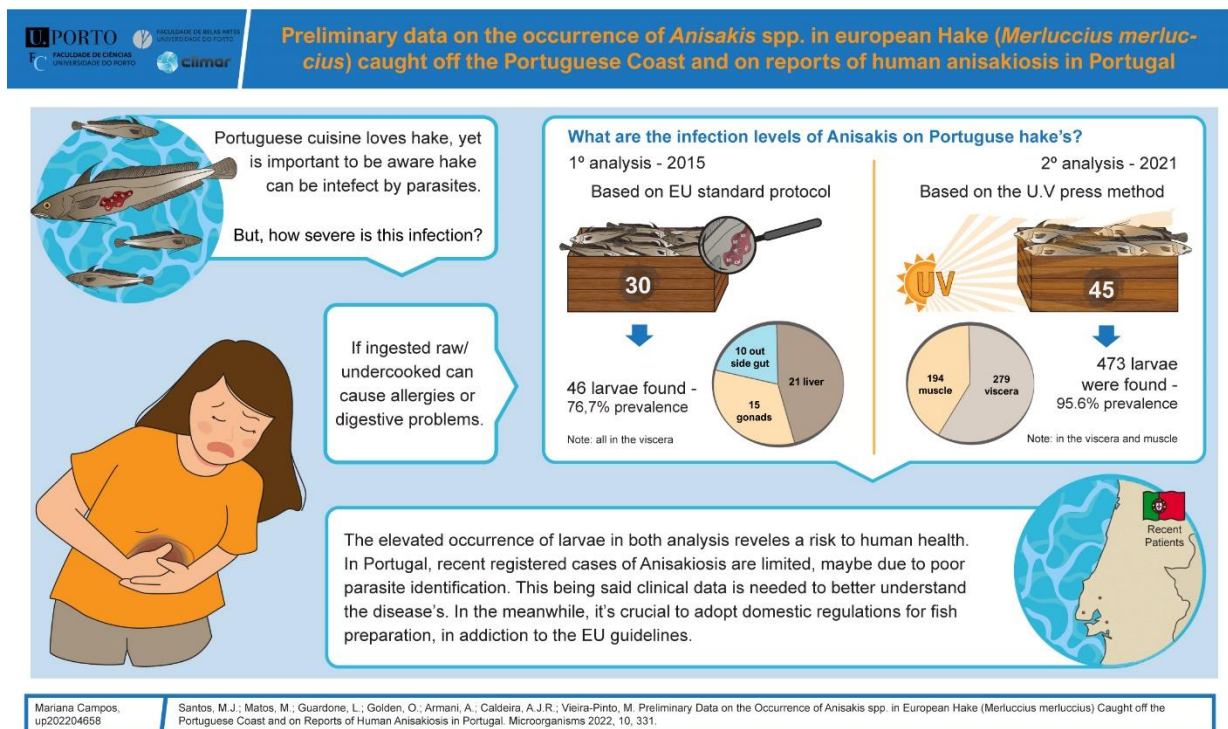


Figure 1: One of the three GAI's developed within the scope of this study. Based on: Santos, M.J.; Matos, M.; Guardone, L.; Golden, O.; Armani, A.; Caldeira, A.J.R.; Vieira-Pinto, M. Preliminary Data on the Occurrence of *Anisakis* spp. in European Hake (*Merluccius merluccius*) Caught off the Portuguese Coast and on Reports of Human Anisakiosis in Portugal. *Microorganisms* 2022, 10, 331. <https://doi.org/10.3390/microorganisms10020331>



PHYSICS

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17.^a EDIÇÃO

21481 | Impact of Small-Scale Structure on the Stochastic Gravitational Wave

Background Generated by Cosmic Strings

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Background & Aim: Cosmic strings are hypothetical topological objects predicted by many Grand Unified Theory models, thought to be produced in the early Universe, due to a symmetry breaking phase transition. During their evolution, they often interact with each other, leading to the formation of discontinuities in the string tangent, known as kinks, and of closed loops of strings. Cosmic string networks are expected to survive throughout the history of the Universe, leaving behind observational imprints, such as the Stochastic Gravitational Wave Background (SGWB). When a loop is formed, it detaches from the network and loses energy in the form of Gravitational Waves (GWs). The superposition of all their emissions generates the SGWB. The power spectrum of the SGWB generated by loops has been computed for different cosmic string models ([1] and [2]). However, kinks are also expected to decay by emitting gravitational waves, but their contributions are often neglected in computations of the spectrum. The main goal of this work is to develop a framework to study the contributions of kinks to the SGWB. **Methods:** This will be achieved by extending existing models in the literature that describe the small-scale structure ([3] and [4]), to include all relevant aspects to study this GW emission, starting by developing an effective model to describe the evolution of the small-scale structure and its impact on the network dynamics, so that it can later be used to study the contributions of kink decay to the spectrum of the SGWB. **Results:** We hope to develop a framework that will allow us to not only quantify the impact of small-scale structure in the SGWB, but also on the SGWB generated by loops. (This is still ongoing work). **Conclusions:** We expect that this framework will make possible to quantify the uncertainties associated with the computation of the SGWB due to the small-scale structure, leading to more precise predictions of this observational signature.

Keywords: Cosmic Strings, Gravitational Waves.

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21611 | Theoretically probing structural and electronic properties of Pr-based crystals for energy applications

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Background & Aim: The Pr-based crystal $\text{Pr}_2\text{O}_2\text{SO}_4$ has recently attracted experimental interest for its potential as a high-quality cathode for Solid Oxide Fuel Cells [1] and as an oxygen storage material [2]. This project has the objective of theoretically exploring the structural, electronic and magnetic properties of this lanthanide oxysulfate with an oxysulfide counterpart $\text{Pr}_2\text{O}_2\text{S}$.

Methods: We will use first-principles techniques to compute and characterize the stable crystal structures. Our calculations will be based on Density Functional Theory (DFT) [3] as implemented in the Quantum Espresso (QE) software package. We will employ exchange-correlation functionals based on the general gradient approximation (GGA) within the Perdew-Burke-Ernzerhof (PBE) scheme. As a member of the lanthanoid series, Pr is a heavy element with unfilled f-orbitals, which means that special care must be taken to assess possible magnetic ground-states, as well as respective strongly correlated states. To address this, we will also perform DFT+U calculations, which add a Hubbard term to the density functional to better capture the above-mentioned effects. **Results:** After converging the parameters related to the basis set size and the \mathbf{k} - mesh density, it is intended to obtain the equilibrium parameters and analyse the energetically more stable structural space group (monoclinic $C2/c$, orthorhombic $I222$ or tetragonal I_42m). The calculation of the inter-site Hubbard parameter is to be performed, and analysis of the partial density of states will aid in the assessment of the importance of the inclusion of the U parameter. The electronic band structure of this material and of the $\text{Pr}_2\text{O}_2\text{S}$ is envisaged, in order to obtain information related to the nature of respective band gaps.

Conclusions: By theoretically understanding the characteristics of $\text{Pr}_2\text{O}_2\text{SO}_4$ and $\text{Pr}_2\text{O}_2\text{S}$, and the physics underlying the functionality of these materials, it will allow for the optimization of the required parameters for other possible applications.

Keywords: Praseodymium Oxysulfate, Density Functional Theory, Quantum Espresso, $\text{Pr}_2\text{O}_2\text{SO}_4$.

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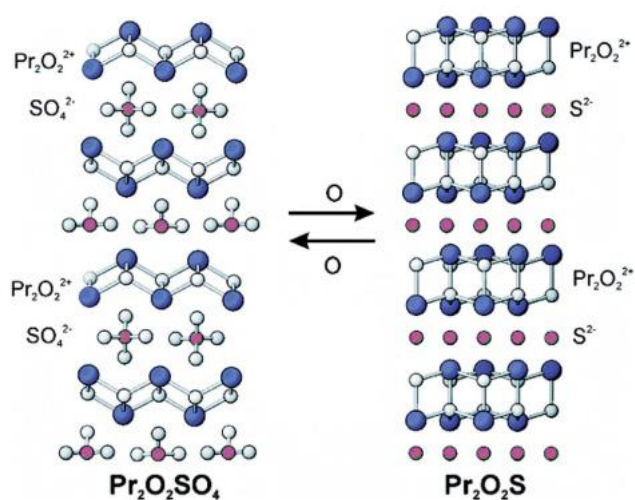


Figure 1: Crystal structure of $\text{Pr}_2\text{O}_2\text{SO}_4$ and $\text{Pr}_2\text{O}_2\text{S}$. This figure has been taken from ref. [1].

21766 | Magneto-structural coupling in Heusler-type alloys with a large magnetocaloric effect

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Background & Aim: Global warming has certainly been a major concern throughout the past decades. The refrigeration industry accounts for 8% of the global greenhouse emissions and uses up to 17% of global power consumption [1]. A potential solution involves the use of magnetocaloric materials, which can change temperature when exposed to a magnetic field under adiabatic conditions. Heusler-type alloys, like MnCoGe, show potential, but their properties can be further optimized by adjusting the transition temperatures through doping [2]. This study aims to enhance MnCoGe properties by substituting the Germanium atoms with Indium. This substitution creates chemical stress aligning the structural and magnetic transition temperatures and thus improving its magnetocaloric effect. **Methods:** MnCoGe_{1-x}In_x (x=0, 0.01, 0.05, and 1) ingots were prepared using an arc melting furnace. Structural analysis was conducted with room temperature X-ray diffraction, and magnetic measurements were performed to study field and temperature influence. **Results:** Preliminary results show that by increasing the Indium percentage, it is possible to lower the structural and magnetic transition temperatures. The magnetocaloric behaviour was studied by calculating the maximum magnetic entropy change. Despite still being lower than what is reported in similar literature [3], it can be further enhanced with heat treatments that will stabilize the crystal structure and induce the chemical stress needed to potentiate the magneto-structural coupling. **Conclusions:** In this work, we were able to synthesize MnCoGe alloys with Indium substitution in order to induce the chemical stress needed to lower and overlap both magnetic and structural transitions, thus leading to an improvement in the materials' magnetocaloric properties. The preliminary results seem to indicate that additional heat treatments would promote and maximize the materials' properties.

Keywords: Heusler-alloys, Magnetocaloric effect, Refrigeration.

Acknowledgments

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- [2] DOI: [10.1063/5.0130035](https://doi.org/10.1063/5.0130035)
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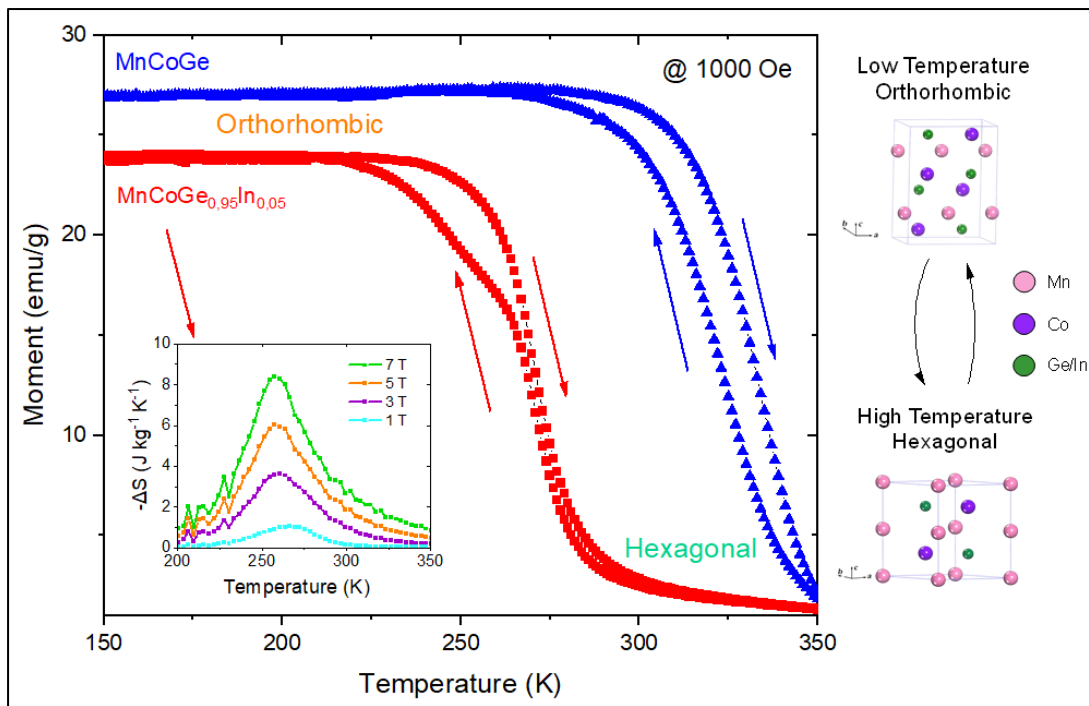


Figure 1: Temperature dependence of the magnetization under a magnetic field of 1000 Oe during heating and cooling for MnCoGe and MnCoGe_{0.95}In_{0.05}. Both samples undergo a magneto-structural transformation from a low-temperature ferromagnetic orthorhombic phase to a high-temperature paramagnetic hexagonal phase. The inset shows the magnetic entropy change as a function of temperature for the MnCoGe_{0.95}In_{0.05} sample with four different maximum variations of applied magnetic fields.

Monitoring

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Background & Aim: Stent implantation is a common procedure for treating arterial blockages, but post-implantation complications such as restenosis, thrombosis, and infection often occur. Pressure monitoring stents have been used to monitor these events, but still present lack of reliability in the precision of the measurements [1,2]. The aim of this work is to develop self-powered and low-cost pyroelectric sensors integrated into stents for the detection of associated complications by monitoring local temperature fluctuations. **Methods:** To assemble the sensors, various ink formulations with zinc oxide nanoparticles (ZnO NPs) as an active material and a polymer as a binder were prepared. The ZnO NPs were characterized by Raman spectroscopy and SEM/EDS. Devices with different geometries were tested and the sensor's outputs were determined experimentally and using numerical simulations. **Results:** A ZnO NPs-based ink has been developed and used to produce flexible test devices by stencil printing, showing a pyroelectric response. Further work will include the use and optimization of other pyroelectric nanomaterials that have higher pyroelectric coefficient and also the implementation of this systems to a real stent. **Conclusions:** Flexible pyroelectric self-powered ZnO NPs-based sensors exhibit a measurable response, demonstrating their potential to be implemented in stents to detect temperature changes associated with post-implantation complications like restenosis, thrombosis, and infection. This successful detection can enable early detection, improving patient outcomes.

Keywords: Pyroelectric Inks, Self-Powered Devices, Smart Stents, ZnO Nanomaterials.

Acknowledgments

This work was financially supported by FCT through projects UIDB/04968/2020 (DOI: 10.54499/UIDP/04968/2020), UIDP/04968/2020 (DOI: 10.54499/UIDB/04968/2020) and 2022.04242.PTDC (DOI: 10.54499/2022.04242.PTDC). MR also thank FCT for the Junior Research Contract with ref. 2022.04179.CEECIND/CP1719/CT0006 in the scope of 5th Individual Call to Scientific Employment Stimulus.

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21907 | Fabrication of Nickel Nanowires for 1D Neuromorphic Systems

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Authors contributed equally to this work*

Background & Aim: The surge interest in neuromorphic architectures has driven the scientific community to explore the direct modulation of brain electrical signals for innovative therapies in neurological disorders [1]. Memristors are pivotal in neuromorphic systems, replicating neuronal communication through artificial synapses via electrical stimulation. However, memristive crossbar devices struggle in mimicking the behaviour of biological neuronal circuits due to their limitations in scalability, device variability and energy efficiency. To overcome these constraints, a physical reservoir computing with a memristive architecture built on self-organized nanowire networks emerged with improved nonlinear dynamics, rapid learning and low training cost [2]. Typically, this architecture uses silver nanowires (Ag NWs) due to their morphological features, high conductivity and biocompatibility. Nonetheless, Ag NWs face limitations such as scalability concerns, structural changes and reliability issues over time. Nickel nanowires (Ni NWs) are gaining attention as alternative material due to their good stability, scalability, conductivity and reduced synthesis cost [3]. **Methods:** In this study, we report the fabrication of neuromorphic devices based on Ni NWs coated with polyvinylpyrrolidone (PVP) through a simple chemical reduction process [4]. **Results:** The composition of these nanostructures were confirmed with X-ray diffraction, along with optical microscopy and scanning electron microscopy (SEM) to examine their morphology. For future work, the neuromorphic device will be manufactured coating the Ni NWs networks in flexible substrates using the spin-coating method. The device performance will be evaluated studying its synaptic learning features by electrical measurements made in a homemade setup using multiple contacts system and a 2400 Keythley Sourcemeter. **Conclusion:** The synthesis and characterization of Ni NWs for 1D neuromorphic computing is pivotal since it provides insights into more efficient brain-like computational systems. These biocompatible devices, which mimics biological synapses, can be used in wide range of applications, including novel therapies for neurologic disorders.

Keywords: Nickel Nanowires, Random Network, Memristor, Neuromorphic Devices, Synaptic Learning.

Acknowledgments

This work was financially supported by FCT through projects UIDB/04968/2020, UIDP/04968/2020 and PTDC/NAN-MAT/4093/2021 and “La Caixa” Foundation within project CCO 204197.

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21959 | Tuning Double Perovskites for Energy Harvesting

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Background & Aim: Perovskite-based Solar Cells (PSCs) rose as a possible environment-friendly solution to enhance devices' efficiency and performance. Perovskite materials have been extensively researched in theoretical modelling and practical applications since they present a unique structure and novel properties [1]. Double perovskites have gained some ground on these studies, once we can replace half of the B-site cations with other B' cations and achieve rock salt ordering between them, exhibiting extraordinary properties when compared to the simple perovskite structure [2]. In this study, we will cover Rare-Earth-based Double-Perovskite compounds synthesis and characterization for energy harvesting applications, enhancing their properties by changing the synthesis procedure route. **Methods:** $\text{Er}_2\text{NiMnO}_6$ and $\text{Nd}_2\text{NiMnO}_6$ were prepared by solid-state reaction [2] and sol-gel method [3], studying the dependence of the final compound characteristics on the synthesis method. Structural analysis was conducted with room temperature X-ray diffraction (XRD), and magnetic measurements were taken to analyse their field and temperature dependence [4]. Morphological characterization using scanning electron microscopy (SEM) was performed to characterize the grain size distribution of the particles. **Results:** Preliminary results show that the XRD pattern obtained for our samples is consistent with the theoretical XRD pattern, emphasizing the role of the different heat treatments on the compound properties. Magnetic measurements show the same behaviour seen in literature [2], having similar orders of magnitude. The magnetocaloric effect shows promising results demonstrating the sample potential. Although, there is room for improvement by subsequent heat treatments and fine-tuning of the synthesis process. **Conclusions:** In this work, we were able to synthesize R_2NiMnO_6 (R = Er, Nd) compounds and evaluate the role of the synthesis method on the final compound properties. The preliminary results seem to indicate that additional heat treatments would promote and maximize the material's properties.

Keywords: Double Perovskites, $R_2\text{NiMnO}_6$ ($R = \text{Er}, \text{Nd}$) Compounds, Solid-State Reaction, Sol-Gel Synthesis.

Acknowledgments

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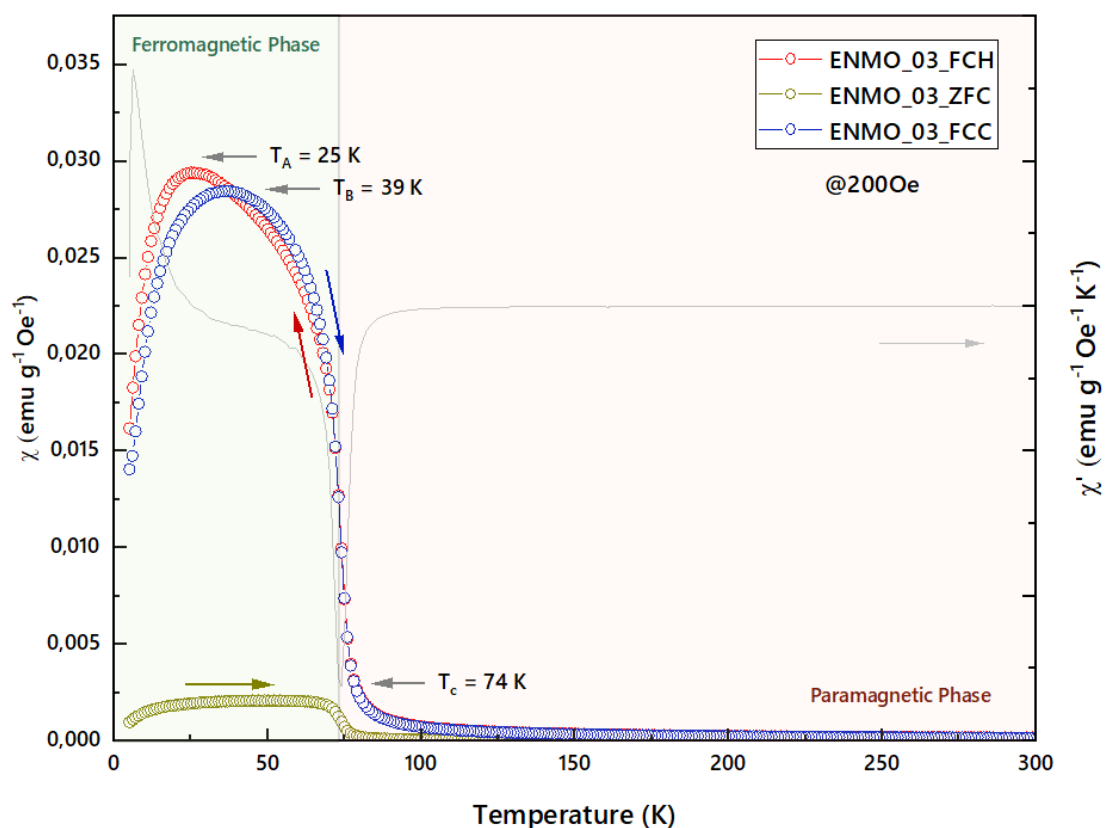


Figure 1: Temperature dependence of the magnetic susceptibility (χ , left scale) and the respective derivative (χ' , right scale) under a magnetic field $\mu_0H = 0.02$ T for $\text{Er}_2\text{NiMnO}_6$.

22055 | Quantum transport in Floquet formalism

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Background & Aim: Different phenomena appear, generally nonlinear with the field intensity, when an electromagnetic field perturbs a crystalline system. It is possible to use a microscopic approach to describe the nonlinear optics response in terms of the current density [1] compute via the density matrix (DM), which fully describes the state of the system and evolves in time under the external radiation field. A frequently used analytical method to compute the time evolution of DM for weak electromagnetic field is time-dependent perturbation theory. When the perturbation become strong enough, the efficacy of the expansion in powers of the field diminishes, necessitating the development of alternative techniques. As a proof of concept, we will consider the response of a semiconductor model with two 1D bands at zero temperature under the influence of a periodic electromagnetic perturbation, with different field intensities.

Methods: As an alternative to perturbation theory, we will use Floquet formalism to study the nonlinear optical response. The premise is to take advantage of the time periodicity of the perturbation with Floquet formalism [2]. The problem will be defined in velocity gauge since the equations for the DM are decoupled for each momentum k [1]. After solving the time evolution equations for each k , we will sum over the first Brillouin zone to obtain the time response in current. **Results:** We will analyse the first-order response using an implementation of the Floquet formalism to the proposed problem and compared with the result in perturbation theory. After proving that this implementation works properly in those limits, we will proceed to study nonperturbative responses. **Conclusions:** The use of the Floquet formalism will allow us to compute the nonlinear optical response of a semiconductor under a periodic electromagnetic perturbation with no restrictions to the field intensity and without performing the numerical time integration of the DM time evolution equation.

Keywords: Nonlinear Optics, Electromagnetic Perturbation, Periodicity in Time, Floquet Formalism.

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22084 | Coherence Length from Correlation of Local Currents

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Background & Aim: The two fully quantum theories of charge transport in metals are Landauer's and Kubo's. Landauer formalism is used to describe transport in mesoscopic devices and the Kubo formalism can be applied to any quantum system, as it is just linear response theory applied to quantum mechanics. There are three transport regimes: ballistic, diffusive and localized. They are defined by the relation between the mean free path, the localization length of the wave functions and another length scale that is related with the coherence of the quantum system. In Landauer's formalism it has a very clear physical meaning, the length of the disordered metallic sample, but in Kubo's formalism it does not. As a solution, in the literature is common to add to the usual model of metals, the tight binding model, a relaxation term characterized by a parameter γ [1, 2]. Our aim is to obtain from this relaxation parameter a length scale in the context of the Kubo formalism that reproduces the behaviour of the charge current associated with each regime of transport. **Methods:** To accomplish this we will characterize the properties of the local currents of tight binding systems approaching the thermodynamic limit. First, by studying how the distribution of the local currents over realizations of disorder behaves as a function of the relaxation parameter, we expect that this will yield a log-normal distribution as is the case in Landauer's formalism [3]. And then, by studying the correlation of the local currents of two bonds as the distance between them increases. **Results:** In a 1d tight binding model with periodic boundary conditions, where for strong enough disorder there exists only the localized regime, we will find a map between the relaxation parameter and a length scale such that the current decays exponentially with the increase of that length scale. **Conclusions:** An understanding of this length scale and of the properties of the local currents would give us a deeper understanding of the Kubo formalism, which is vastly used in the literature.

Keywords: Quantum Transport, Kubo's Formalism, Anderson Disorder.

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PSYCHOLOGY AND EDUCATIONAL SCIENCES



21350 | “I swallowed the black pill and it was rubbish”: (De)construction of the masculinities of Involuntary Celibates

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Background & Aim: Incels or Involuntary Celibates refers to those unable to establish sexual and/or romantic relationships. Given that research on the masculinities of Incels or Involuntary Celibates is still in its early stages, especially in non-Anglo-Saxon contexts, the main aim of this study is to gain a better understanding of how Incel men construct and define their masculinities in Portugal. **Methods:** To this end, nine semi-structured interviews were conducted with Incels and Ex-Incels aged between 19 and 28, and a reflexive thematic analysis [1] was carried out. **Results:** Through thematic analysis, six themes emerged: (1) being a man in the eyes of society, (2) Incel: a stigmatizing identity, (3) swallowing the blackpill, (4) the effects of Inceldom, (5) misogyny and shit-posting, and (6) political interpretations of masculinity. These themes denote the need to better understand gender relations from the perspective of Incels. **Conclusions:** The results led us to conclude that masculinities of Incels are characterized by internal and dialectical contradictions, incorporating elements of various “Others” into their identity projects, without relinquishing spaces of power. Therefore, it is essential to pay attention to the elasticity of hegemony and how systems of inequality can remain hidden in historically new ways [2, 3]. This study also highlights how men are willing to change and reject harmful ideologies, countering the understanding of men as mere victims of hegemonic prescriptions [4]. In sum, this work encourages the adoption of hybrid masculinities as a reflective lens to account for transformations in the field of masculinities.

Keywords: Incels, Involuntary Celibates, Thematic Analysis, Hegemonic Masculinity, Hybrid Masculinities.

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21399 | Exploring Intercultural Sensitivity in Portugal: Influence of Sex and Sexual

Orientation

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Background & Aim: This study sought to explore the topic of Intercultural Sensitivity (IS) in the Portuguese population, according to the categories of sex (female and male) and sexual orientation (heterosexual and other). Several studies (Holm et al., 2009; Karimi et al., 2019; Rodríguez-Izquierdo, 2022) show that females have a more positive attitude towards other cultures than males. However, there is a scarcity of studies that cross IS with sexual orientation, with some addressing empathy, the central element of IS (Chen & Starosta, 1997), which concluded that the participants' sexual orientation may influence their levels of empathy (Perry et al., 2013; Sergeant et al., 2006). Considering this empirical evidence, this study sought to answer the question "Does the level of IS vary according to different categories of belonging?", formulating the hypotheses: H1 - Female individuals are expected to have a higher level of IS than male individuals; and H2 - Sexual orientation is expected to influence IS levels. **Methods:** The study involved 558 individuals fluent in Portuguese, who answered an online questionnaire consisting of sociodemographic questions and the IS Scale in its version translated into Portuguese. The data was analysed using descriptive statistics in the Amos IBM SPSS 29.0 software. **Results:** Females had higher levels of IS than males, in line with the results of several studies (Karimi et al., 2019; Rodríguez-Izquierdo, 2022), and in two scale's factors, confirming research findings that report differences in some dimensions of IS (Holm et al., 2009). Regarding sexual orientation, no differences were found in the levels of IS between heterosexual individuals and individuals with other sexual orientations, although differences were found in three scale's factors. **Conclusions:** This research contributes to the continuity of studies on the subject of IS, demonstrating its importance and expression, to guarantee an inclusive and welcoming society, educated for multiculturalism.

Keywords: Intercultural Sensitivity, Sex, Sexual Orientation.

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21432 | Pedagogical practices that promote inclusion: perspectives, challenges and reflections

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Background & Aim: This research, being carried out as part of the dissertation for the Master's Degree in Educational Sciences at the Faculty of Psychology and Educational Sciences of the University of Porto, seeks to investigate the perceptions of classroom teachers in relation to inclusive pedagogical practice, thus identifying barriers and limitations to its implementation.

Methods: From the phenomenological-interpretative paradigm [1], based on a qualitative approach, using the Case Study method [2], taking into account the complexity of the case in question, which are the pedagogical practices that promote inclusion, the procedures for data collection are based on the questionnaire survey, the interview survey and participant observation with the purpose of understanding the reality under study and its participants.

Expected Results: It is hoped to identify teachers' perceptions of the effectiveness and gaps in the application of current legislation, to identify the facilitating and challenging aspects faced by teachers in the design and implementation of inclusive pedagogical practices, to understand how teachers evaluate the strategies adopted in their inclusive pedagogical practice, as well as to understand how teachers make the necessary adaptations to meet the specificities of the students and the support used.

Keywords: Pedagogical Practice, Inclusion, Pedagogical Differentiation.

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21439 | The notion of inclusive education for children and young people with educational needs: the reframing process of the Learning Support Center (CAA) as a movement for equity and pedagogical differentiation

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Background & Aim: Through my professional internship as part of the master's degree in educational sciences at the Faculty of Psychology and Educational Sciences of the University of Porto, I intend to observe, in a participatory way, the routine with children and students identified with educational needs (EN) and, thus, understand the dynamics of the space of the Learning Support Center (CAA), through the interaction of professionals with themselves, as well as understanding, simultaneously, what opportunities are available to these children/students at school, together with the community and their families. In this context, I foresee the elaboration of a proposal to re-signify the CAA, following the current legal framework and the assumptions of Inclusive Education in Portugal. **Methods:** In this ongoing research, the methods used come from the participant observation that I carried out over the four months that I was present in the context, these being: field notes, surveys of parents, context professionals and students, interviews with the entire community as well, and do a focus group with a twelfth-year arts class, who created a project for the CAA space. **Expected Results:** As a result of this study, is expected to obtain a sample of the educational community about their day-to-day opinion regarding CAA, combining it with academic theory, to obtain specific objectives and resolutions to support the change and progression of the space, towards improving learning and inclusion of all and for all students. **Conclusions:** The conclusions of the work will only be verified at the end of writing the thesis, but conclusions that can be applied in the practice in the educational context in question are expected. The impact of the conclusions must be massive, considering everyone's participation, as well as the assessment of the needs of the spaces.

Keywords: Education, Inclusion, Equity, Special Needs, Pedagogical Differentiation.

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21442 | Mathematical Mail: feedback and letter writing as promoters of written mathematical communication

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Background & Aim: Expressing mathematical ideas to others can translate as a challenge for students, particularly when it comes to communicate their thinking in writing. Therefore, a study is being conducted within the internship of a Master's in Mathematics Teacher Education, aiming to understand how peer feedback through the exchange of letters contributes to the development of written mathematical communication. **Methods:** This qualitative study is based on a pedagogical intervention, focusing on letter exchanges through "Mathematical Mail" between two 8th grade classes in a school of Porto. Each student receives a sheet with a task, a response sheet to write in a letter format, an envelope and a stamp. Besides explaining in detail how they solve it, they can establish a communication with their randomly allocated "mathematical friend" as in a real letter. Subsequently, the letter would be placed in the mathematical mailbox and later returned to its author with the feedback provided by the "mathematical friend" of the other class. The data comprises students' written work from four different tasks throughout the 2nd semester (including feedback provided to their peers), a questionnaire and interviews with some of them, regarding the importance of receiving and giving feedback and how it affects their own work. **Expected Results:** With this study, is expected that students recognize the necessity to communicate their mathematical thinking clearly and in a detailed way for others to understand it. Furthermore, it may have a positive effect regarding self-regulation as it allows students to identify aspects in which they can improve. Moreover, the opportunity to analyse different solving methods might expand their critical thinking as well as enhance their mathematical language to express mathematical ideas precisely. **Conclusions:** This study might help understand how students put into writing what they think and verbalize and enhance mathematical language through practice and peer feedback.

Keywords: Feedback, Mathematical Communication.

21474 | The development of mathematical reasoning in synthetic geometry

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Background & Aim: The most recent curriculum guidelines for secondary school mathematics [1] will start being in the field in 2024/25, but, in 2023/24, some classes are already piloting the new curriculum. Mathematical reasoning is highly emphasized in the new curriculum as a transversal skill. This study was framed in the context of one pilot class, and it aimed at understanding how students develop their mathematical reasoning, namely concerning the processes of conjecturing, generalizing, and justifying [2], in the theme of synthetic geometry.

Methods: The study follows a qualitative approach to research. Synthetic geometry was taught over 20 lessons of 50 minutes each. The tasks were constructed by the curriculum authors and tried under an inquiry-based teaching approach [3]. Data is still being collected and it includes field notes from classroom observations, records of students' work on GeoGebra, students' written productions, audio-recordings of classroom collective discussions, pair work, and task-based interviews to a selected number of students. **Results:** Students showed difficulties in understanding what is entailed in the process of conjecturing, but they have shown some positive progress. Yet, this is not the case concerning the other two processes. Once they analyze a particular case, students have trouble in understanding the need to generalize. The process of justification presents the most challenges – the lack of experience in doing justifications and the need for rigor in expressing justifications are the two major aspects accounting for those difficulties. In addition, students resist to the need of justifying their conjectures. The software GeoGebra proved itself to be an essential resource in supporting students in engaging in reasoning processes. **Conclusions:** The preliminary results suggest the need to reinforce classroom work around reasoning processes, supported by GeoGebra, as they are at the core of mathematical understanding.

Keywords: mathematical reasoning, synthetic geometry, GeoGebra.

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21482 | Mathematical Learning with the Use of Digital Class Notebook and GeoGebra: A Pedagogical Experience in the Learning of Linear Functions and Systems of Linear Equations

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Background & Aim: This poster presents an ongoing investigation embedded in my internship in the master's degree in Mathematics Teacher Education for Middle and Secondary School at Faculty of Sciences of the University of Porto. The aim is to answer the question "In what ways do students apply their mathematical knowledge and technological fluency to acquire new knowledge?" Specifically, it intends to explore students' interaction with GeoGebra and Microsoft OneNote. **Methods:** The data collection will involve the use of questionnaires to sixteen eighth-grade students, and two exploratory tasks in GeoGebra on the topics of Functions and Algebraic Expressions and Equations. The first task aims to understand how the visualization of properties, offered by GeoGebra, helps the development of students' learning. In the second task, the goal is to identify how students use GeoGebra to solve problems. In addition, it will be conducted semi-structured interviews to some students. **Expected Results:** This investigation seeks to comprehend students' perspectives on the use of digital resources in mathematics and to identify the potentialities and limitations of these tools. It also aims to understand how students can apply their mathematical knowledge and how the integration of these technologies stimulates students to put their knowledge into action.

Keywords: Digital Technologies, Techno-Mathematical Fluency, Geogebra, Microsoft Onenote.

21547 | Perspectives and difficulties in the face of problem formulation: a research with 8th grade students

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Background & Aim: Alongside problem solving, problem formulation has gained prominence as a pivotal theme in the research of mathematics education [1]. However, research on problem formulation is still at an early stage [2]. The formulation of problems is beneficial for students, as it promotes the consolidation of their mathematical knowledge and skills [3]. In this context, the aim of this research is to understand the students' perspectives on problem formulation and what difficulties they encounter in the process of formulating problems, considering a mathematical problem as a challenging situation that induces a search for strategies to achieve a clear goal, but not immediately accessible [4]. **Methods:** The study follows a qualitative and interpretative approach [5]. Based on a pedagogical intervention, that's still in progress, in an 8th grade class characterized by regular problem formulation opportunities, the data to be collected includes students written productions in problem formulation tasks and semi-structured interviews conducted with some students. The choice of students is based on diversity in terms of evidenced problem formulation skills. **Results:** During the first phase of the pedagogical intervention, it was possible to reach a consensus on what the students understand to be a mathematical problem: a) based on a situation that provides the necessary information for its resolution; b) it can incorporate day-to-day situations; c) it involves calculation strategies in its resolution; d) it can assume a high degree of difficulty. **Conclusions:** This problem definition agreed upon in the classroom is close to the probable definition considered in this research and it is critical for students to be able to understand what problem formulation is, understand what its upsides are when it comes to the learning process and, in this way, engage in tasks about that theme.

Keywords: Problems, Problem Formulation, Students Perspectives, Difficulties in Problem Formulation.

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21575 | Feedback and its relationship with the improvement of learning in mathematics: perspectives of 10th grade students

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Background & Aim: Feedback is the key to regulating learning; however, it does not always have significant implications for students' learning [1]. Past research indicates characteristics that feedback must follow in order to be effective [2], [3] but beyond that, the effectiveness of feedback is dependent on students' understanding of that feedback [4]. The research presented here aims to know the perspectives that 10th grade students have on the written feedback given by teachers and to understand how students use it to improve their productions. **Methods:** I promote a pedagogical intervention, in a 10th grade class, which is based on the resolution of three problems carried out in two phases [5]. In a qualitative and interpretative approach, the students' written productions of each problem will be collected, as well as the written feedback provided by the teacher, the answers to a questionnaire applied at the end of the intervention and interviews with some students. The choice of these students is based on the diversity of their interpretations and attitudes towards the feedback provided. **Results:** At the end of the first moment of pedagogical intervention (completion of the first problem), all students showed improvements from the first to the second phase. The students revealed that the feedback received was helpful in improving their resolutions and indicated that they would not make any changes to the feedback received. In general, they used the feedback to improve mathematical language, to correct mistakes they had made, and to complete the resolution by coming up with a final answer. **Conclusions:** The expected changes in the students' work, after receiving feedback, were not the same for all of them and the same type of feedback received different responses from them. Students responded differently, revealing that feedback should be specific and appropriate for each student.

Keywords: Formative Evaluation, Feedback, Students' Perspectives.

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21589 | The role of the gallery walk to foster 9th graders' skills in solving-and-expressing mathematical problems

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Background & Aim: Current guidelines for school mathematics in basic education stress the role of mathematical transversal skills, such as communication and problem solving, in the learning of mathematical topics [1]. The idea of solving-and-expressing mathematical problems reflects how those two skills are interrelated [2]. The gallery walk (GW) is a teaching strategy that stems from problem solving and engages students in written and oral communication of their thinking processes [3,4]. In this study, we aim at understanding how the GW can contribute to improve 9th graders' solving-and-expressing abilities. **Methods:** The study follows a qualitative approach to research, based on two GWs. Students were organized in small groups (4 students each). Data is still being collected and it includes students' field notes from classroom observations, students' written productions and answers to short post-GW questionnaires, and audio-recordings of classroom collective discussions. **Results:** The first round has already been completed. Students engaged significantly in the activity proposed, but this was not free from difficulties. The main challenges were related to the construction of posters, as products of the GW. Students had trouble in organizing ideas in the posters and in explaining clearly how they had thought to solve the problems at hand. In general, they did not experience difficulties in solving the problems. **Conclusions:** In the first round of the intervention, students were able to reflect on the strengths and weaknesses of their posters. They realized where they should better focus their attention for the upcoming GW in order to improve the organization of the posters and the clarity of the description of their thinking process. In terms of classroom management, the exhibit of the posters must be better organized, namely by spreading the posters on the walls around the whole classroom, allowing more room for the students to analyse the posters and learn from one another.

Keywords: Gallery Walk, Problem Solving, Mathematical Communication.

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21609 | What do students value in learning mathematics? An exploratory study with 9th graders

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Background & Aim: The Portuguese Association of Mathematics Teachers (APM) is part of an international consortium focused on researching what teachers and students value in mathematics education [1]. This focus of research is in its initial steps in Portugal. So far, studies have only focused on teachers' values and results have pointed out that teachers tend to value "on one hand, aspects that hold the students responsible for their own learning (e.g., motivation and attention) and, on the other hand, aspects external to the teacher (e.g., curriculum)" [2, p. 51]. In this study, we aim at knowing what students value in mathematics learning. **Methods:** The study follows a mixed approach to research and targets a 9th grade class of a public school. The quantitative part of the study is based upon a questionnaire that is already validated by a research team associated with APM [2]. The questionnaire includes mainly closed questions and Likert-scale items, which will be treated statistically, and three open-ended questions, which will be analysed qualitatively, based on the adaptation of a codebook developed by that same research team. Some students will be interviewed to gain a deeper understanding of their questionnaire answers. **Results:** The study is still in its initial phase. The questionnaire is being set out in google forms, and the interview questions are being prepared. The results are expected to shed some light into what students value in learning mathematics. This will constitute important information in order to reflect on how students' values are aligned with those of their teachers, which, in turn, may offer suggestions to improve learning environments in order to meet students' values. **Conclusions:** The results of the study will add to the growing body of knowledge about teachers' and students' values in mathematics education, an area of research that is just starting in Portugal.

Keywords: Values in Mathematics Education, Students' Values About Learning, Values Alignment.

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21618 | Sexual Violence and Gender: The Role of Rape Myths and Violent

Pornography- A Study with College Students

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Background & Aim: The proliferation of violent pornography and its potential link to sexually aggressive behaviour has raised concerns among authors [1]. While research has delved into this relationship, the role of rape myths, misconceptions that perpetuate victim-blaming and minimize sexual violence, is an important factor [2]. Furthermore, female perpetrators are often overlooked, despite evidence suggesting their involvement in sexual offenses [3]. Addressing these gaps is crucial for a comprehensive understanding of the dynamics between these variables, particularly among college students. The objective of the current study is to test the hypothetical association between the use of violent pornography, the endorsement of rape myths, and the adoption of sexually aggressive tactics, while also examining potential disparities between genders. **Methods:** A sample of 919 participants was collected through an online self-report survey targeting university students with at least 18 years old. Sexually aggressive behaviours were evaluated using SABS and ECVS was used to measure the endorsement of rape myths. This survey also included a questionnaire about the use of violent pornography. A series of Mediation Models will be used to test the hypothesis, more specifically to study if the rape myth endorsement plays a mediating role in the relationship between the use of violent pornography and sexually aggressive behaviour as well as to see if there are gender differences. **Results:** It is expected that the endorsement of rape myths mediates the relationship the use of violent pornography and sexually aggressive behaviour. Gender differences will be explored in the study. **Conclusions:** By acknowledging the often-dismissed phenomenon of female sex offenders, it challenges stereotypes and offers insights for targeted interventions. These findings can inform policies and educational efforts aimed at preventing sexual violence and fostering healthier attitudes towards sexuality among young adults.

Keywords: Sexual Violence, Rape Myths, Violent Pornography.

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21628 | "Freedom feels so good"- The life story of a former inmate

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Background & Aim: The main aim of this research, realized in the ambit of the curricular unit “Sociology of Education” (LCE), was to analyse the life story of an individual who experienced imprisonment in a prison in the north of Portugal. Relying on contributions from authors from Sociology of Education, we seek to understand how childhood experiences in the family environment influenced his school pathway; his entry into a situation of confinement; and the changes it may have brought to his life. **Methods:** To achieve these objectives, we resort to the biographical method that seeks to listen to life stories in their true essence, reported by those who experienced them (Conde, 1993). We crafted a script for the non-directive interview, transcribed the interview, and developed the biographical narrative for analysis. **Results:** The interviewee, aged 32, had a period of incarceration spanning from 17 to 25 years old. The narrative analysis shows that he resisted the established school rules, forming a school counterculture with his friends (Willis, 1991). Moreover, his primary socialization, characterized by early exposure to drugs and violence, contributed to the manifestation of deviant behaviours throughout his childhood and adolescence, thus confirming his *habitus* (Bourdieu, 1989). These types of behaviours ultimately led to his arrest, subjecting him to constant surveillance and control during his time in prison, as detailed in the interviewee's biography (Foucault, 1992). However, resisting institutionalized rules demonstrated his agency power (Willis, 1991). Upon his release from prison, he deliberately distanced himself from family members and friends who maintained undesirable behaviours, indicating an awareness of his social position (Freire, 1976). **Conclusions:** In conclusion, we understand the structural impact of habitus on individuals, yet awareness empowers individuals to challenge the "natural" order of things. Nevertheless, the question remains: to what extent does this awareness facilitate the disruption of social reproduction?

Keywords: Habitus, Prison, Awareness, Biographic Method.

Acknowledgments

First of all, we would like to thank the interviewee for openly sharing his life story. We also want to thank Professor Marta Sampaio and Sofia Marques da Silva for the assistance provided throughout the completion of this work and our colleague Filipe Lopes for providing us with the interviewee's contact information.

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21714 | Level of support for the rights of CPLP students in higher education in Porto

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Background & Aim: The internationalisation of higher education in Portugal has resulted in the growing presence of students from the CPLP in universities. Many of these students, after arriving in the country, encounter bureaucratic, economic and cultural constraints and experience discrimination [1]. The aim of this study is to find out the level of support for minority rights among higher education students in Porto, and its variations according to gender, nationality and political ideology, variables that the literature has shown to be relevant [2, 3].

Methods: The work was carried out using a questionnaire survey with items that explore the general perception of the presence of CPLP students in higher education and the Minority Rights Support Scale [4], which covers 3 dimensions: Individual Rights, Cultural Rights and Positive Discrimination. The survey was administered online and 124 higher education students responded, 105 of them national and 19 international, all from the CPLP. The data was analysed using SPSS v.27. **Results:** The vast majority of respondents (85.5 per cent) consider the presence of CPLP international students at university to be completely positive. There is clear support for the individual and cultural rights of these students, but less support for positive discrimination. There is a significant correlation ($r=-.35$) between ideology and positive discrimination, suggesting greater support from international students. The differences between inter/national students, on the other hand, show a more benevolent and optimistic view of national students towards welcoming CPLP students and less support for positive discrimination measures. **Conclusions:** Overall, respondents support the presence of international students in higher education and the individual and cultural rights of CPLP students. However, the lower support for active and compensatory policies in favour of CPLP students may suggest a fear of losing rights/privileges or a lack of recognition of discrimination.

Keywords: Discrimination, Minority Rights Support, Higher Education, International Students.

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21810 | Challenges and Potentialities of the Digital Education in the Brazilian Context

During the Pandemic

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Background & Aim: This poster presents the work carried out by three Educational Sciences students, 2 undergraduates and 1 master's student, at the FPCEUP Scientific Research Initiation Program. In this program, the students worked closely to the researchers in the project "Digital Education in rural and peripheral areas - challenges and opportunities", developed at FPCEUP in partnership with the OEI (Organization of Ibero-American States). With this study it was aimed to know small dimension experiences and identify constrains experienced at school level, in peripheral areas, from 11 Latin America and PALOP countries, resulting from the prolonged closing of schools due to the CoViD-19 pandemic and the subsequent transition to digital education. Thirty-eight interviews were realized by the team of the project. The students collaborate in the transcription of part of the interviews, participated in several discussion meetings with project team members. The experience of the students in this project has become an opportunity to experience being a researcher and to deepen their knowledge about Digital Education in Rural or Peripheral areas. In this poster, considering the work developed by the students, it was selected one country, Brazil, so they could experience the analysis, discussion, and present exploratory results. In Brazilian context, were developed 7 semi-structured interviews with educational professionals (teachers, municipal and regional coordinators, and a researcher linked to the University). The analysis and discussion of the data led to the emergence of thematic categories that discuss and problematize issues related to difficulties in accessing digital education, decreased learning, regional/local specificities, worsening socioeconomic difficulties, the vicious relationship between "digital exclusion" and "socioeconomic exclusion" during the pandemic, and raise questions about the challenges and concerns of peripheral and marginalized contexts, but also debate possibilities, solutions and resources.

Keywords: Digital Education, Rural and Peripheral Education, Brazil.

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21905 | "It's always women!": the biographical method as a tool to account a social and educational journey

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Background & Aim: This brief investigation was developed in the context of the course of Sociology of Education (1st cycle of Educational Sciences.UP) consists of analysing a female biographical narrative, seeking to understand the dialectic between social theory and the life of a black mother, academic and immigrant. **Methods:** Since we position ourselves in a comprehensive scientific paradigm, we believe that not recognising experience as a source of knowledge weakens theory and practice (Torres, 1998)¹. We have taken on an extended responsibility by using biographical methods to study women's trajectories, which have been historically neglected by academia (Coelho, 2012)². This perspective led us to use a biographical method as the foundation of the research, resorting to a biographical encounter, narrative co-construction and its subsequent analysis searching. **Results:** By developing a sociological gaze, we identified the possibility of applying theories of Equality of Educational Opportunity (Coleman, 2011)³ to different dimensions of the narrator's life, which allowed us to build bridges that transcend the conventional use of the core concepts of analysis for an in-depth understanding of how different social institutions (re)produce oppressive class structures. Thenceforth, we identified not only the materialisation of theorised social phenomena in practice, but also the similarities and continuities in the generational narrative line of the lives of the narrator and the women in her family, characterised transversally by the importance of education and resilience in face of social inequalities, particularly sexism. **Conclusions:** These women challenge social hegemonies and become pathfinders for others in different dimensions of life, making female resistance a family tradition. By reflecting on her experiences, the narrator recognises that she inherits the collective memory of the women in her family.

Keywords: Sociology of Education, Biographical Narrative, Life Journey, Women's Stories, Resilience.

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21942 | Corporate Benefits: an organizational development project

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This project aims to optimize the communication and dissemination of corporate benefits in a Portuguese company based in the north of the country. The project began by identifying the need to correct the lack of knowledge and dispersal of information about the benefits offered to employees, which is crucial for retaining talent and promoting a healthy organizational work environment. Following the model of Cummings and Worley (2015), the diagnosis made it possible to understand the current state of this process in the organization. Specifically, the benefits provided by the organization were surveyed using written documents and individual interviews (including informal ones) with superiors and employees, as well as sector meetings. The organized information was fed back to the company (feedback). Based on the diagnosis, a Benefits Manual was drawn up and it was proposed that the organization review the holistic rewards model (total rewards), suggesting the adoption of a flexible benefits plan. To improve internal communication (Almeida, 2013), we suggest a benefits module in onboarding and the employee portal, information videos and a Telegram channel. In terms of external communication, to attract talent, it is proposed that benefits be included in job fairs and adverts, and in a strategic presence on social networks and the corporate website. In addition, it is suggested that a flexible benefits system be adopted via outsourcing. The proposal presented considers the context of the company's restructuring and the simplification of benefits management and communication. Once the changes have been implemented, their impact will have to be assessed. The benefits offered by organizations have a direct impact on the well-being and productivity of employees, influencing internal coordination and promoting talent retention. This strategy makes it easier to reconcile professional and personal life (Gupta & Shaw, 2014).

Keywords: Organizational Development, Internal and External Communication, Corporate Benefits.

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21950 | Communicating Bad News in Emergency Health Care: clinicians needs and perceptions

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Background & Aim: Communicating bad news is a common occurrence in the healthcare sector, especially in emergency services. Communicating bad news is a common occurrence in the healthcare sector, especially in emergency services. However, it is also recognized as one of the most stressful uncomfortable and difficult activities [1]. Clinicians may appear cold or exhibit depersonalized communication due to a lack of training in clinical communication. Therefore, improving their skills in communicating bad news is essential to enhance their proficiency in this area. The purpose of this study is to understand the specific needs of clinicians and identify effective strategies to tailor educational programs to the demands of emergency healthcare [2].

Methods: A group of emergency health professionals was invited to participate in the study. We collected sociodemographic data and performed a professional characterization. Participants described their experience and training in delivering bad news in emergency settings. The evaluation included how clinicians rated knowledge, skills, and practical application of seven relevant skills [adapted from 3]. We also scrutinize pReferences: regarding methods and design of communication skills training. **Results:** We expect that less trained participants and those who perceived themselves as unprepared theoretically report lower capacity, and avoid delivering bad news. **Conclusions:** Breaking bad news can be a difficult task for clinicians due to the complexity of communication and emotional intensity involved. This highlights the need for specific training programs that are focused on addressing the needs and pReferences:of clinicians when it comes to delivering such news. Evidence suggests that role-playing or visualizing real-life scenarios during training is an effective way of facilitating learning. Therefore, adapting the training environment to participants' working conditions can further enhance the effectiveness of such interventions, leading to better outcomes.

Keywords: Communicating Bad News, Emergency Health Care.

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21984 | Students' Happiness and Well-Being: Contributions from the Voice of Students at School

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Background & Aim: This communication seeks to bring to the school debate issues of autonomy and pedagogy, innovation and educational policies that promote success and well-being, with a primary focus on children: Are schools only concerned with recovering learning, or are they also concerned with recovering human beings? From a theoretical point of view, the concept of happiness has occupied the minds of scholars. Studies on happiness define it "as a state of mind, the management of one's own life, the sensation of flow" [1]. We aim to problematize happiness and well-being using several authors and the PERMA Model. The political framework also discusses educational policies and regulations, namely a PPIP Project (pedagogical innovation project). Its aim was to implement innovative actions, according to mandatory objectives [2], and combat school failure and dropout, setting the domains and limits of innovation on the curriculum, school management and organization (idem). **Methods:** Aimed at students in the 2nd cycle at a school in the north of Portugal which was one of 6 schools that took part in the PPIP, having other innovative elements, namely, a wellbeing observatory and a wellbeing coordinator. We intend to collect and analyse a set of data obtained through: Focus group discussions, analysing their opinions on well-being and happiness; Semi-structured interview with key informant (curricular flexibilization and pedagogical innovation); Document analysis (decrees and school). **Conclusion:** Analysing the legislation and the school's regulatory documents, we see that these pilot projects, after their 1st period in force, showed a reduction in school retention numbers. Despite improvement, it seems that all the regulations continue to focus on building a school from a top-down perspective. We argue that a bottom-up approach is more effective in building a happy and innovative school that meets not today's society, but the society of the future.

Keywords: Student Well-Being and Happiness, School Innovation Policies, School Autonomy, Student Voice.

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SPORT SCIENCES

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17.^a EDIÇÃO

21362 | Biomechanical characterization of an artistic swimming women's duet: a case study

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Background & Aim: Artistic swimming is an Olympic sport that requires the development of strength and technique [1]. For the duet competition, both swimmers should exhibit a similar level of skillfulness to reach a more precise synchronization. While there are few studies on the topic [2], this study aimed to conduct a detailed biomechanical characterization that may help dissect individual differences and adjust training planning to get a more homogenous duet.

Methods: An international-level women's duet (17.5 ± 0.5 years) attended two pool testing sessions (48h apart). The first session comprised an in-water assessment with two tethered tests (kick pull and prone standard sculling) at maximum intensity in 20s. The swimmers remained connected to an electromechanical device (Swim-Spektro) to collect the peak force and mean force (in N). The second session comprised a dryland strength and power assessment. A handheld dynamometer (microFET[®]2) was used to retrieve the isometric peak force (in N) of dominant (D) and non-dominant (ND) upper limbs during shoulder internal (IR) and external (ER) rotations at the horizontal plane. A contact mat (Ergojump) was used to collect the maximum jump height (in cm) during three countermovement jumps. The percentage of variation (Δ , %) between the duet was computed for all variables. **Results:** There was a trend for swimmers to present distinct characteristics in the kick pull ($\Delta_{\text{peak force}} = 39.60\%$; $\Delta_{\text{mean force}} = 45.08\%$) and the prone standard sculling ($\Delta_{\text{peak force}} = 16.39\%$; $\Delta_{\text{mean force}} = 21.66\%$). This was accompanied by isometric force in the internal ($\Delta_{\text{IRD}} = 23.66\%$; $\Delta_{\text{IRND}} = 33.73\%$) and external ($\Delta_{\text{ERD}} = 11.58\%$; $\Delta_{\text{ERN D}} = 2.11\%$) rotations followed by the maximum jump height ($\Delta_{\text{jump}} = 7.41\%$). **Conclusions:** Women belonging to an artistic swimming duet are susceptible to having distinct biomechanical features. Coaches should be aware that an individualized training approach may be required to get a more homogenous duet from a biomechanical standpoint.

Keywords: Strength, Force, Power, Training, Women.

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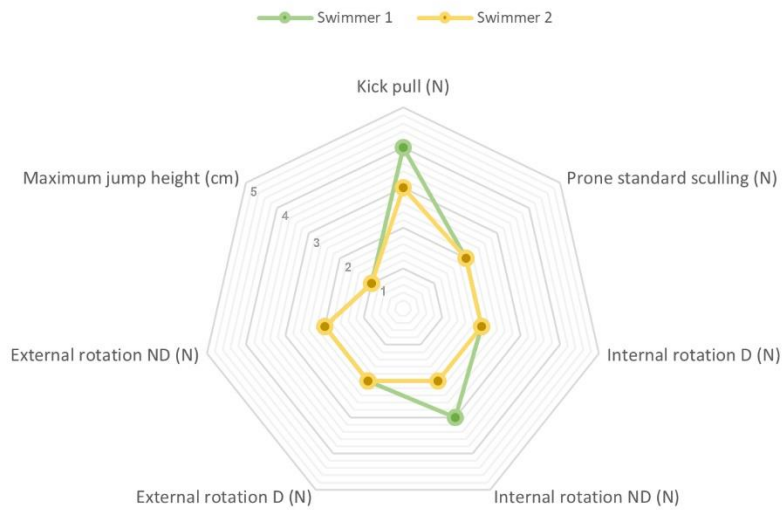


Figure 1: Radar chart illustrating the individualized biomechanical characteristics of the duet. Thresholds are defined as follows: 1: 0-50; 2: 51-100; 3: 101-150; 4: 151-200; 5: 201-250.

21365 | Force and symmetry in girls and boys during front crawl tethered-swimming

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Background & Aim: As the ability to apply force effectively in the water is a key factor in competitive swimming, contralateral force asymmetries have been a topic of interest [1]. Young swimmers tend to present an asymmetric motion at front crawl [2], but little is known about whether this is a sex-specific phenomenon. The aim of this study was to compare the upper limb force and symmetry of girls and boys during tethered front crawl swimming. **Methods:** Forty young swimmers (20 boys: 12.7±0.6 years; 20 girls: 12.0±0.7 years) were instructed to perform 30 s of front crawl tethered swimming (full body) at maximum intensity. The in-water force was measured using a load cell and the peak force (FPEAK, in N) of the dominant (D) and non-dominant (ND) upper limbs was retrieved. The Symmetry Index (Syl, %) was estimated and interpreted as reported elsewhere [1]. An independent t-test was used to compare all variables according to the swimmer's sex and the Cohen's d (d) was selected as an effect size. **Results:** Differences between boys and girls were found for FPEAK D (boys, 136.3±36.3 N vs girls, 105.1±18.0 N; p=0.001, d=1.1) and FPEAK ND (boys, 130.8±37.1 N vs girls, 99.3±18.5 N; p=0.002, d=1.1). However, the Syl was similar between cohorts (boys, 8.7±6.3 % vs girls, 9.9±5.9 N; p=0.551, d=0.2) showing a tendency to be within the cutoff value (i.e., 10%). **Conclusions:** While the in-water force during the front crawl swimming at an early age seems to be influenced by the swimmer's sex both boys and girls showed a similar symmetric motor pattern. Despite this, swimming coaches must be aware of the breathing pattern, as it can be a secondary factor influencing the force and symmetry outputs.

Keywords: Evaluation, Swimmers, Asymmetries, Kinetics.

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21411 | Random practice and blocks practice: What is more effective in learning the soccer passing technique?

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Background & Aim: The Contextual Interference (CI) hypothesis, stated by Battig (1979), argues that, given continuous interference in planning processes, random practice (high CI) generates lower acquisition but higher transfer and retention capacities of a motor skill than practice in blocks (low CI). The purpose of this study was to investigate what practice is most beneficial for learning the passing technique in football as an attempt to generalize CI results to an applied situation. **Methods:** The sample consisted of 20 young federated players (10 males and 10 females) aged between 9 and 10 from 2 different clubs in the AF Porto, Boavista FC and SC Rio Tinto. The participants passes to six targets in a random or blocked practice and were compared in terms of precision in passing to a moving colleague. We performed a robust trimmed ANOVA to evaluate changes from pre to posttest between groups and Yuen's test to compare groups' performance during practice. **Results:** We found no significant differences within (from pre to posttest) or between groups in this experiment (p 's > .050). Also, we found no significant differences between groups during practice ($p = .209$). **Conclusions:** We found no differences between random practice and block practice on performance and learning the passing technique in football – challenging the expectations of the CI hypothesis.

Keywords: Random Practice, Blocks Practice, Contextual Interference, Pass, Football.

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21590 | Physical activity patterns in children and youth in Down syndrome: An exploratory study

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Background & Aim: Down syndrome (DS) is a genetic disorder leading to a specific phenotype combining unique intellectual, physical and physiological characteristics. Typically, persons with DS have an increased risk of associated comorbidities such as obesity, diabetes, thyroid disorders and other physical and mental health problems. However, in the last decades, life expectancy has increased due to improvements in medical services and to the implementation of physical health interventions targeting active lifestyles for persons with DS. However, there is a dearth of knowledge about the physical activity (PA) levels of children and youth with DS. Therefore, this study aims to characterize the PA levels in children and youth with DS. **Methods:** Ten participants with DS aged between 7 and 19 (n=4 girls; n=6 boys) were conveniently selected to take part in the study. A sociodemographic questionnaire will be filled by the parents to collect information about personal (e.g., age), clinical (e.g., medication intake; associated comorbidities; therapies) and sports variables. The GTX3 triaxial accelerometer (Actigraph, Florida) will be used to objectively measure daily PA. Participants will be instructed to wear an accelerometer for 7 consecutive days, placed on the right hip using an adjustable belt. Exceptions include time spent sleeping and showering. Participants will be instructed to maintain their usual routine of activities. **Results:** This is an ongoing study and the data collection procedures are being carried out. Data analysis will allow to verify if participants comply with World Health Organization recommendations for daily PA. **Conclusions:** Suggestions and considerations will be provided in order to promote the implementation of active lifestyle interventions aiming to decrease sedentary behavior and increase moderate-to-vigorous physical activity among children and youth with DS.

Keywords: Down Syndrome, Accelerometers, Sedentary Behavior, Active Lifestyles.

21645 | Teachers' and students' perceptions on PE curriculum model

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Background & Aim: This study aims to understand the teachers' and students' perceptions on PE curriculum model, specifically the multi-activity curriculum and the duration of didactic units, with more or fewer classes, based on their conception of Physical Education. **Methods:** Interviews with six teachers, all from the same school, and two focus groups with 9 students from the same class were performed. Questions related to their conception of Physical Education, as well as their preference for the multi-activity curricular model and their respective reasons were used in the interviews. Thematic analysis was used for data scrutiny. **Results:** The results show that, in general, teachers agree with the curricular model used by the school, despite differences in their conceptions of Physical Education. The multi-activity curriculum, in the opinion of most teachers, does not suit the best teaching and learning process for students. As for students, they understand that the current curricular model does not match their preferences and that it has a negative impact on their learning and motivation for sports practice. **Conclusions:** The teachers agree with the school's current curriculum model, but the same perspective is not shared by the students. Such positions create an obstacle in the teaching-learning process since the current model does not motivate the students, a crucial factor for a teacher to be able to teach and be effective in their classes.

Keywords: Conception of Physical Education; Teaching models; Multi-activity curriculum; Physical Education curricular models.

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21649 | The associations between physical fitness and fundamental movement skills in primary school children: The REACT study.

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Background & Aim: Fundamental movement skills (FMS) lay the foundation for specialized sports' skills and complex physical activities. These movement skills and physical fitness (PF) jointly unfold during childhood. Previous reports suggested a positive relationship between PF and FMS [1-3]. We aimed to probe into the relationship between muscular, motor, and cardiorespiratory fitness with FMS during the primary school years. **Methods:** Our sample is from the REACT study [4] and comprises 983 children (524 girls) aged 6 to 10 years. We used the "Meu Educativo[®]" platform to assess five FMS, namely object control, using a scoring system from 1 to 3 and summed them across the five skills [5]. PF was evaluated with standard protocols, and three main facets were used: motor aptitude (50-yard dash and shuttle-run test), muscular fitness (handgrip strength and standing long jump), and cardiorespiratory health (pacer test) [4]. We calculated a standardized score (z-score) for each test and then summed it within each component to provide a score for each PF component. Ordinal logistic regression was used to explore the connection between PF components and FMS, adjusted for sex and age. The analysis was conducted on STATA v.18 with a 5% significance level. **Results:** In general, boys were more proficient than girls in their FMS (Odds ratio (OR)=5.29, $p<0.001$), and older children were more likely to be proficient than younger ones (OR=1.26, $p<0.001$). All three PF components were significantly associated with the total FMS score (muscular fitness: OR=1.12, $p=0.001$; motor aptitude: OR=1.49, $p<0.001$; cardiorespiratory health: OR=1.25, $p<0.001$). **Conclusions:** More physically fit children were more likely to be more proficient in their fundamental movement skills. This suggests that with carefully planned intervention programs (in physical education classes, and in sports practices), not only improve children's physical fitness, but also their fundamental movement skills. This will help children become more proficient in combining motor skills as well as in more complex skills.

Keywords: Physical Fitness, Fundamental Movement Skills, Children.

Acknowledgments

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21651 | Associations between socio-economic status and children's health-related physical fitness in primary school children: The REACT study.

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Background & Aim: The familial social background of a child can significantly impact their behaviors and health [1]. However, existing reports show inconsistent results regarding the influence of socio-economic status (SES) on different components of health-related physical fitness (HRPF) [1-4]. Thus, this study explored the association between SES and HRPF in primary school children. **Methods:** The sample included 979 children (523 girls) aged between 6 and 10 years from the REACT study [5]. Physical fitness was assessed with standardized protocols, and we considered three components: motor (50-yard dash and shuttle-run test), muscular (handgrip strength and standing long jump), and cardiorespiratory (pacer test) [5]. A standardized score was calculated for each test, and the results were summed to obtain a score for each fitness component. SES was assessed with the Portuguese school social support system. Data analysis consisted of linear regression to examine the links between SES and each HRPF component (motor, muscular, and cardiorespiratory fitness), with sex and age as covariates. The SPSS v.29 software was used in all calculations, and the significance level was set at 5%. **Results:** Boys (muscular=0.54±0.12, p<0.001; motor=0.64±0.10, p<0.001; cardiorespiratory fitness=0.36±0.06, p<0.001) and older children (muscular=1.41±0.05, p<0.001; motor=0.90±0.04, p<0.001; cardiorespiratory fitness=0.27±0.03, p<0.001) were more physically fit in the three components. SES was only significantly associated with cardiorespiratory fitness (p<0.05), i.e., children from higher SES families tended to be more fit than their peers from low SES families (b=0.243±0.088, p=0.006). **Conclusions:** Children from higher SES families were more fit in cardiorespiratory terms than their peers from lower SES. Hence, it is important to establish programs that provide equal opportunities for children from various socioeconomic backgrounds to enhance their physical fitness levels, particularly cardiorespiratory fitness.

Keywords: Children, Physical Fitness, Socioeconomic Status.

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21693 | The role of synergetic elevation of the body's center of mass in basketball free throw shooting

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Background & Aim: The synergistic interplay between posture and movement is highly emphasized in ballistic movements such as free throws in basketball. Also, the release height is a determinant kinematic parameter for successful outcomes in basketball shooting (Tran & Silverberg, 2008). In fact, coaches widely believe that the higher the release height, the greater the chance of success. Yet, how players explore movements to release the ball at those heights has been largely unexplored. In this study, we extracted kinetic (center of mass) and kinematic parameters (joint motions) of the movement, analyzed the time difference between center of mass peak height and ball release of elite players and compared with non-athlete college students. **Methods:** The sample comprised 11 male basketball players, aged 13.65 ± 0.44 years and with 6.64 ± 1.91 years of formal training experience, who were selected by the coaching staff of the Porto Basketball Association to form an elite under-14 regional team. Players performed a series of 10 free throws while having their movements tracked by motion capture cameras. From these, the position of the center of mass was calculated and the moment of ball release subtracted from it. These results were compared to a previous study (Verhoeven & Newell, 2016) on college students. **Results:** The basketball players showed a median of 80.4 ms between the peak center of mass height and release of the ball, but with a broad range of values (min=46.5 ms; max=164.2 ms). These values encompass the values of poor (107.4 ms), medium (90.7 ms) and good non-athlete college students (75.1 ms). Of importance, all basketballers of the present study anticipated the peak center of mass moment in the throw. **Conclusions:** Young elite basketball players do not differ from lower levels of free-throw skill in terms of the relationship between center of mass and moment of ball release.

Keywords: Center Of Mass; Ball Release; Free Throw; Youth Players; Basketball.

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21827 | Performance progression in skins race during the LEN European U23

Swimming Championships

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Background & Aim: Performance progression in swimming has been employed according to the standard competition model by analyzing heats, semifinals, and finals [1]. Recently, the European Aquatics (LEN) introduced the skins events that are characterized as a back-to-back race based on a knockout model composed of three rounds and ending with just two swimmers. However, it remains unknown how swimmers progress in this type of competition model. This study aimed to analyze the progression in the 50 m freestyle skins race at the LEN European U23 Swimming Championships. **Methods:** Official race times from 12 (six women and six men) swimmers (20.3±1.8 and 21.0±1.3 years, respectively) who participated in the first and second rounds (R1 and R2), and/or finals (F) of the 50 m freestyle skins races event at the LEN European U23 Swimming Championships (2023, Dublin) were extracted from the Microplus Timing and LEN official websites. Only swimmers aged between 19 and 23 years belonging to an LEN or Non-LEN Federation (i.e., other invited members of World Aquatics) were considered. The percentage of performance improvement (IMP, %) for individual times (T_{50} , s) between all rounds was considered as the performance progression variable. **Results:** A negative progression (T_{50} increase) was found between R1 and R2 in women's (R1: 25.72±0.48 s, R2: 26.44±0.46 s, IMP: -3.65%) and men's (R1: 22.35±0.20 s, R2: 23.85±0.28 s, IMP: -6.59%). The same trend was found between R2 and F for both cohorts (women: R2: 26.44±0.46 s, F: 26.25±0.59 s, IMP: -0.64%; men: R2: 23.85±0.28 s, F: 24.84±0.49 s, IMP: -4.87%). **Conclusions:** Swimmers participating at the LEN European U23 Swimming Championships progressed negatively in T_{50} between all rounds in a skins race event. Although this competition model may rely on fatigue tolerance due to the short rest (3 min between rounds), some adjustments can be made in the race strategy.

Keywords: Swimming, Freestyle, Sex, Rounds, Time.

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21887 | Feasibility of a 12-week physical exercise intervention in clinical context on patients with Benign Prostatic Hyperplasia

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Background & Aim: Physical exercise has been a viable intervention in the management of a wide range of pathologies (Pedersen and Saltin, 2015), some of which double as risk factors for Benign Prostatic Hyperplasia (BPH), a pathology which prevalence already increases drastically from aging alone, with prevalence rising from 8% in the 4th decade of life to 50% in the 6th decade (Berry SJ, et al, 1984), characterized by specific Lower Urinary Tract Symptoms (LUTS), such as nocturia, urinary frequency and/or urgency, reduced urinary flow rate, incomplete bladder voiding and hesitation, as described by Laborde and McVary (2009), with Erectile Dysfunction often accompanying BPH, with an apparent higher association and severity in patients with BPH/LUTS (Braun et al., 2009). As such, given the inexistence of a structured exercise protocol in clinical context for BPH, this project comes as an exploratory effort to determine whether said intervention is viable. **Methods:** This prospective interventional study's sample was composed of 16 participants, with ages ranging from 53-79 ($66,81 \pm 8,61$ years) who manifested BPH and BPH-related LUTS both with and without Erectile Dysfunction (ED). The participants were randomly assigned to two groups: Intervention (n=9) and Control (n=7), both to attend a total of 36 training sessions, with 3 sessions per week over a 36-week period. Whereas the control group's protocol was based of full-body, low intensity stretching and low intensity aerobic conciliated with cognitive exercise, the intervention group's protocol involved three 1-hour sessions of both aerobic exercise and strength training. Physical fitness was tested validated tests. Abdominal, hip and calf perimeter and body composition estimation by bioimpedance too were determined, as was Health-Related Quality of Life (HRQOL) through condition-specific questionnaires. **Results:** The clinical context has proven to be as challenging as expected, namely due to the available equipment both in quantity and quality, resulting in challenges regarding intensity increments in the exercises selected for the intervention. At the time of submitting of the project, results of the final evaluation were yet to be collected and analyzed. However, considering continuously released evidence, the intervention is expected to result in evident positive results in most if not all evaluated parameters. **Conclusions:** Although the final data had

not been collected and processed at the time of submitting, it is expected in accordance with current literature that this project is feasible. And even if proven non-feasible, it may still be attributed to the lack of materials or perhaps an incorrect exercise prescription regarding the FITT factors. With few materials and equipment, to increase intensity, one may resort to prescribing HIIT workouts, which may be a viable alternative, given the increasing amount of evidence regarding it as safe as it is efficient (Martland, R., et al., 2020).

Keywords: Benign Prostatic Hyperplasia; strength training; aerobic training; Lower Urinary Tract Symptoms; Health-Related Quality of Life.

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21912 | A Reflection on Congruence between Fan Profiles and Sponsor Brands in Portuguese Football Clubs: A Research Proposal

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Background & Aim: The growing interest in brands within the sports entertainment industry is reflected both within and outside event venues. This can be attributed to the unpredictability and emotionally engaging nature of sports. Understanding fan behavior is crucial for sponsors, as it can positively influence their attitudes and purchase intentions. This study is based on the conceptual model by Pradhan et al. (2020), adapting the theoretical S-O-R (Stimulus-Organism-Response) framework proposed by Mehrabian and Russell (1974). It investigates whether congruence between fans' personalities and sponsoring brands leads to favorable attitudes towards these brands. Therefore, the aim is to comprehend how fans of the Primeira Liga football clubs in Portugal respond to stimuli from the sponsoring brands of their favorite clubs.

Methods: This is a quantitative research utilizing a sample of approximately 500 supporters of the teams in the Portuguese Primeira Liga, of both genders, and of legal age, who attend at least one match in the stadium. The questionnaire incorporates scales such as Aaker's (1997) Brand Personality Scale (BPS), Yoshida et al.'s (2014) Four Types Engagement Behavior in Spectator Sport, Olson and Thjømmøe's (2011) adapted Sport Brand Attitude, and Yoo and Donthu's (2001) adapted Brand Purchase Intention (BPI). The theoretical model analysis will be conducted through structural equation modeling using the statistical program AMOS. **Results:** A positive influence is expected from the congruence between fan engagement and brand personality, indicating that brands aligned with fans' self-image have the potential to boost the purchase intention for sponsors of their favorite teams. **Conclusions:** The understanding of congruence between fans and sponsoring brands is crucial for more assertive decisions by managers and marketing professionals. This not only avoids negative reactions from fans but also strengthens the competitive position against non-sponsoring brands.

Keywords: Sports Marketing, Sports Brands, Sports Consumer, Self Congruity.

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21936 | Analyses of swimmers dry-land training effect

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Background & Aim: Dry-land training control is fundamental to determine the evolution of the swimmers' performance throughout a training season. Coaches usually evaluate the force of several muscles and apply a training program to improve it, analysing results individually, but not the whole group, meaning that information about the training general effect might be lost. This study aims to determine the usefulness of an empirical approach compared to individual swimmers' analyses. **Methods:** Five male and three female juvenile swimmers (14.25±0.43 vs 13.33±0.58 years, 175.00±5.20 vs 163.67±6.81 cm and 58.8±5.18 vs 54.97±7.78 kg) were evaluated twice, with an interval of five weeks (during which they performed dry-land strength training). The maximal force (1 RM) of the biceps, triceps, pectoral, deltoids, quadriceps and dorsal muscles was measured by performing 10 repetitions each, starting by a chosen weight and increasing it until failure. The 1RM force was equal to the weight lift*[1+(0.033*number of repetitions until failure)] to compare the two evaluations. [1]. A paired t-test or a Wilcoxon test was used when appropriate, and Hedges' d was selected as an effect size measure. **Results:** Individual analysis showed an improvement in force in all the muscles and group analysis showed that force improvements had to consider gender effect, once females have no differences between evaluation moment one (M1) and two (M2). In quadriceps and dorsal tests males had all the same individual force in M1 and the same occurred within the females group. **Conclusions:** group analysis allowed to go further the individual analyses, adding the following information: (1) response to training was expressive for male swimmers and maybe not effective for females and (2) Quadriceps and dorsal test seemed to not be adequate to evaluate 1RM swimmers' force. The empirical approach to data treatment revealed to be important to better understanding the training effect.

Keywords: Swimming, Training, Strength, Dry-Land, Evaluation.

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	Male	ES <i>d</i>	Female	ES <i>d</i>
Biceps M1	17.00±5.79*	0.69	6.67±4.16	0.53
Biceps M2	21.20±6.38		9.00±4.58	
Triceps M1	39.80±8.67*	0.35	24.33±4.61	0.64
Triceps M2	43.00±9.51		27.33±4.73	
Pectoral M1	47.00±6.67*	0.47	21.66±4.61	0.68
Pectoral M2	50.20±6.90		25.00±5.20	
Deltoid M1	26.40±7.96*	0.30	11.00±1.73	0.69
Deltoid M2	28.80±8.14		9.67±2.08	
Quadriceps M1	20.00±0.00*	-----	10.00±0.00	-----
Quadriceps M2	22.80±0.45		13.00±1.00	
Dorsal M1	50.00±0.00*	-----	30.00±0.00	-----
Dorsal M2	53.00±0.71		33.67±0.58	

***p≤0.05**

Figure 1: Evolution of the force values (kg) corresponding to 1RM of male and female swimmers. M1 – first evaluation; M2 – second evaluation; ES – effect size.

21939 | Aquatic competence of first-year undergraduate sport students at the University of Porto

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Background & Aim: Human interaction with water has different forms, such as responding to the needs of pleasure, survival, therapy or performance [1]. Sport students are expected to meet technical and conditional criteria to become teachers or swimming coaches. This study aimed to determine how far the first-year sport students at the University of Porto are from the prerequisites and the minimum time to approve in the swimming curricular unit. **Methods:** At the beginning of the swimming curricular unit, 126 first-year sport students (93 males and 33 females) performed two maximal front crawl swimming tests (50 and 200 m). Times and distances swam were registered and compared with prerequisites to apply to the Faculty of Sport (47 and 51 s at the 50 m for males and females, respectively) and the minimum time requested for being approved at the swimming curricular unit (4 min in 200 m). The number of students with times under and above the marks were counted, and percentages of occurrence were determined. In the 200 m event, the number of students who changed from front crawl to another swimming technique and those who did not fulfill the total swim distance was also counted. **Results:** Seven females (21.2%) and 18 males (19.4%) had 50 m swimming times above the pre-requisites minimum target. Ten female (30.3%) and 40 male (43.0%) students could swim the 200 m distance under 4 min. Only one female and three males felt the need to change from front crawl swimming technique in the 200 m distance. Many students (12 females and 33 males, 36.4 vs 35.5%) could not fulfill the total distance. The mean distances swam for those were 113.54 ± 28.86 and 100 ± 28.06 m (respectively). **Conclusions:** Some students made their marks worse in the 50 m, as they swim below the time required in the prerequisites they completed in the same academic year. Many students access de Faculty of Sport of the University of Porto without sufficient aquatic competence (expressed by technical and conditional skills) to successfully follow and complete the first-year swimming curricular unit.

Keywords: aquatic competence, swimming, sport students

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21961 | Physical activity and competitive sports practice in university students without sports-related curricular units

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Background & Aim: The practice of physical activity is a governmental concern related to the population's health [1], as well as the sports participation. The scholar Physical Education appeals to the involvement in motor practice, but no equivalent curricular unit exists in the university with that purpose. It is also known that one of the factors that promote sports' dropout is the transition to university [2]. By so, this study aimed to identify the practice of physical activity and competitive sports, including dropout, among university students without sports-related curricular units. **Methods:** Forty-nine students (21.0±7.7 years, 164.8±7.1 cm and 61.3±20.1 kg) from a bachelor's degree volunteered to fulfil a self-administered questionnaire with two sections: (i) student demographics; and (ii) physical activity and sports practice. Descriptive analysis was made based on: 1) health condition; 2) physical activity practice; 3) competitive sports practice; and 4) dropout in the transition to university (and corresponding reasons). The questions were answered through a "yes" or "no", open or closed-ended option, and counts and percentage counts were reported for variables. **Results:** Figure 1 shows the percentage counts for all variables. The majority of the students (n=31) reported that have "good" health (panel A) and practiced physical activity (panel B). Only five students practiced any competitive sport (panel C), including dance (n=3), volleyball (n=1) and handball (n=1) (panel D). Despite this, 10 students dropped out in the transition to university (panel E), indicating as main reasons the lack of time (n=5), lack of interest (n=3) and bullying (n=1) (panel F). **Conclusions:** University students without sports-related curricular units but who practice physical activity or sports are unable to maintain sports competition on their daily basis after joining the university. The Faculty board should understand this behavior and develop strategies to counteract the lack of time for these students.

Keywords: Health, Physical Activity, Sports Competition, Dropout.

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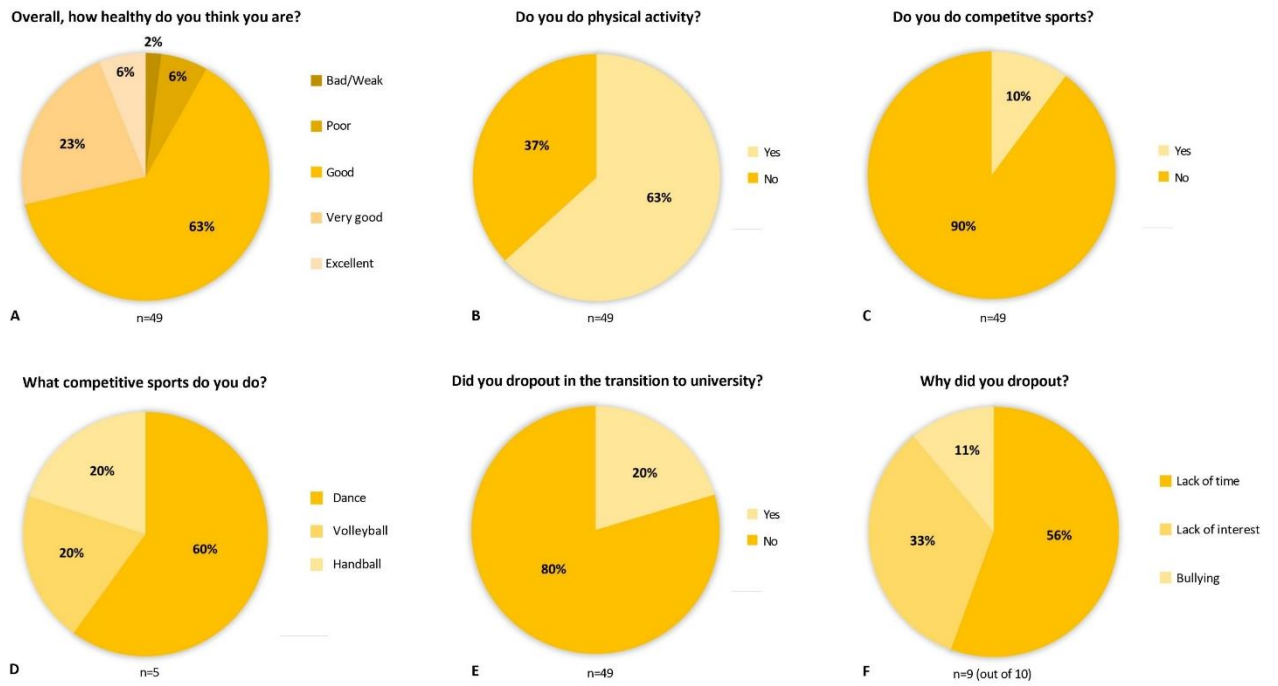


Figure 1: Physical activity and competitive sports practice among university students without sports-related curricular units.

21991 | Performance related differences between male and female rowing teams

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Men are faster than women due to their physiological and anthropometric differences such as larger and more powerful muscle mass, higher maximal oxygen consumption and increased biomechanical efficiency [1]. In rowing, variables such as cycle rate, distance per cycle and velocity are key features used to structure and control the training process. The current study aims to assess the differences of performance between two national champion teams (male and a female Coxed 8) in a 2000m rowing competition. We hypothesized that male present higher values in all performance related variables. Two teams of eight rowers were assessed in a 2000m competition conducted in a race-course using similar high-performance boats, with the total race distance being divided in 100 m blocks for posterior analysis. Race total time, cycle rate, cycles per 100m block, distance per cycle and velocity per block were assessed using a 15Hz GPS and a 3D IMU (GPSPORT, Canberra, Australia) [2]. An independent T-test was conducted to compare the differences between the teams in the selected variables ($p \leq 0.05$). Mean \pm SD values of the selected performance related variables are displayed on Table 1. Differences were observed in all studied variables except the rowing cycles per min and the distance per cycle. The advantage of the male team might be related due to the better anthropometric characteristics, physiological profile and ability to produce muscle power. Both teams present the same rowing cycles per block and distance per cycle, indicating that the male team was more efficient. Also, the small margin of distance covered per cycle favors the male team when multiplied for the total number of cycles needed to cover the 2000m race. The male team produced higher velocity covering the distance in less time due to higher muscle power and efficiency. Further studies should include more teams to be able to produce guidelines for rowers and coaches to guide their training plan.

Keywords: Rowing, Rowing Performance, Gender, Gender Differences.

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Table 1: Mean \pm SD values of the selected performance variables

Variable	Male	Female	<i>p</i>
Race time (s)	367.78	498.24	
Cycles rate (cycle/min)	42.65 \pm 2.66	31.61 \pm 1.28	< .0001
Rowing cycles per block	13.00 \pm 0.79	13.10 \pm 0.91	0.71
Block time (s)	18.38 \pm 0.60	24.89 \pm 0.59	< .0001
Distance / cycle (m)	7.69 \pm 0.37	7.64 \pm 0.29	0.61
Velocity / block (km/h)	19.61 \pm 0.66	14.47 \pm 0.34	< .0001

$P \leq 0.05$

22015 | Talent development environment: A case study in a sailing club

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Background & aims: This case study investigated the relevance of the talent development environment in a sailing club in the northern region of Portugal, identifying key factors impacting this process. **Method:** The methodological approach involved exploring the perspectives of a manager, a coach, and an athlete, adopting a qualitative methodology with semi-structured interview scripts. Individual interviews, averaging 25 minutes in duration, were conducted. Thematic analysis was employed for data analysis. **Results:** The findings revealed that the club's environment was perceived as a crucial factor in talent development. Influences were primarily observed through the institutions supporting and believing in the athletes' journeys, as well as through peers sharing interests and goals in the sport. The specific sports culture of sailing and the country was also identified as a conditioning factor for talent development, with the unique nature of sailing as an uncommon sport presenting challenges in acquiring support from those less familiar with it. Participants underscored the importance of gathering more insights into the issues examined in this study to enhance the approach of entities, clubs, and federations in developing future athletes. Additionally, they emphasised the importance of raising public awareness to promote the sport's recognition and attract new members and enthusiasts. **Conclusion:** This study showed that, in the examined club, the talent development environment played a significant role in shaping athletes. From a broader perspective, discussing sailing in this context could mean bringing recognition into the scientific domain of a complex and comprehensive sport in various domains, offering new insights into the sport's development.

Keywords: Talent Development Environment, Sailing, Case Study, Qualitative Study.

22027 | Results of a digital marketing strategy applied in the Portuguese Swimming Federation

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Background & Aim: Digital marketing has become essential for every consumer-centric business. The world of sports is no exception, and this channel of digital communication is already considered the most important one [2]. Almost all sports institutions use some kind of social media interactions, but do not always analyze the results of the communication strategy. This study aimed to analyze the results of the digital communication strategy applied by the Portuguese Swimming Federation. **Methods:** The strategy was based in an increasement and regularization of the publications in Instagram, based on contents (stories and posts) of all the aquatic disciplines of the Federation during a period of two months. News about competitive events were published before (alert), during (athletes' results) and after (results celebration) each competition. Other announcements, like selections for training campus, were publish too. Four metrics (reach, interactions, followers and clicks) were analyzed through the *Meta Business Suit site*. The absolute frequency was controlled together with the percentage of rises and drops for each metric variable. **Results:** During the two months period, the number of posts remained regular and the number of stories increased (Fig. 1A). Also increased the number of publications views (Fig. 1B), interactions (e.g., likes, comments, shares) (Fig. 1C), followers (Fig. 1D) and clicks in hyperlinks (Fig. 1E). The raise tendency started one month after the application of the marketing strategy, and an activity peak was observed in February, during the World Aquatics Championships 2024, mainly due to the gold medals of a Portuguese athlete. Through the Top 3 publications it was possible to understand that the Instagram community preferred contents in video format. **Conclusions:** The application of a digital marketing strategy allowed to the Portuguese Swimming Federation a better dissemination of news related to several swimming events and a better interaction with the swimming community.

Keywords: digital marketing, social media, sports federation, swimming

Acknowledgments

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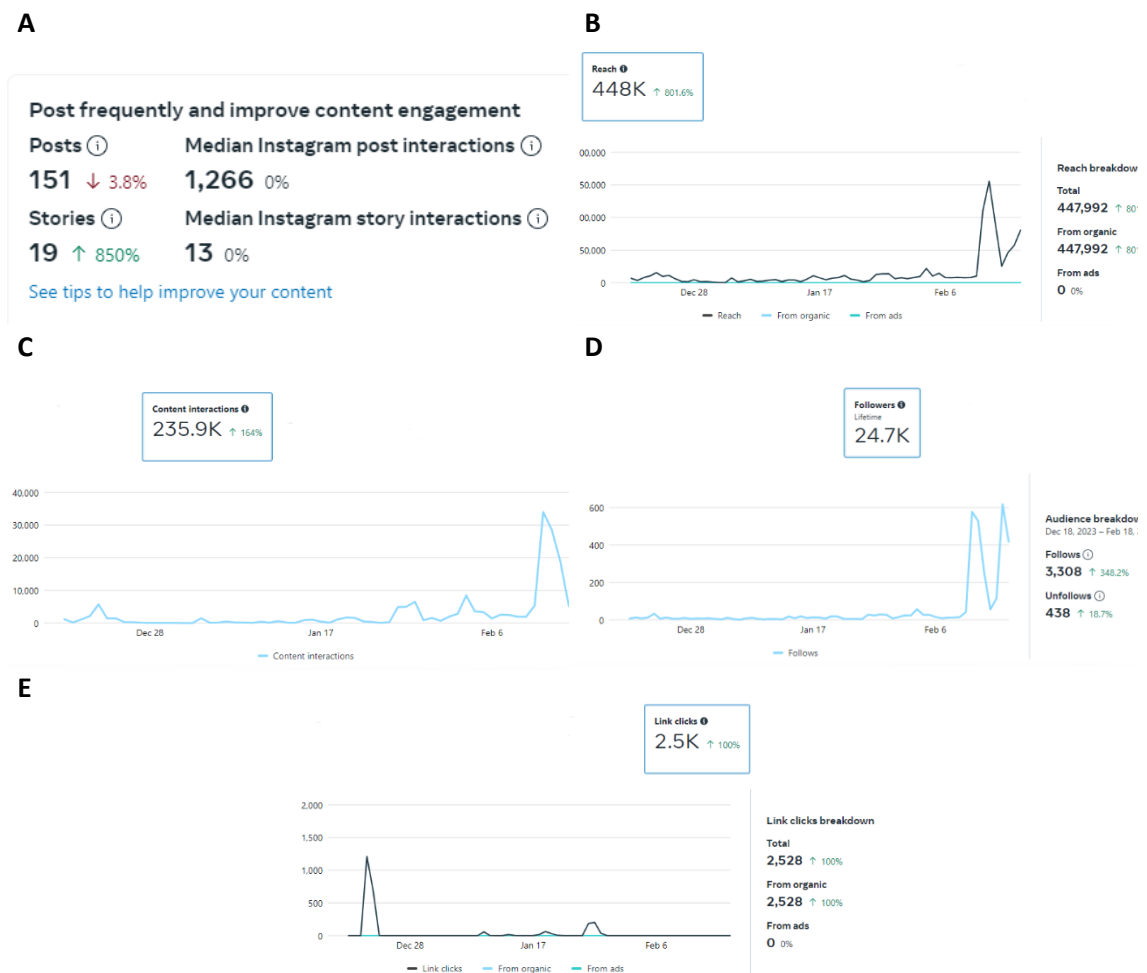


Figure 1: Analysis of the posts' publication frequency (panel A), reach (panel B), interactions (panel C), followers (panel D) and clicks (panel E) in Instagram, in result of the application of a digital marketing strategy by the Portuguese Swimming Federation.

22079 | Body composition and physical fitness data in a group of inpatients of an Internal Medicine Department

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Background & Aim: Changes in body composition (BC) occur as part of the normal aging process and are associated with important effects on health and function (Marzuca-Nassr et al., 2020). Therefore, the objective of this article is to gather information from inpatients in Internal Medicine Department (IMD), regarding their BC and physical fitness (PF). **Methods:** The sample consists of 64 patients [37 men (M); 27 women (W)] admitted in the IMD with different causes. Anthropometric assessments [weight, height, body mass index (BMI), fat mass (FM), fat free mass (FFM)], vital signs [heart rate (HR), systolic (SBP) and diastolic (DBP) blood pressure], PF assessments with handgrip strength (HG), physical activity level with the International Physical Activity Questionnaire (IPAQ) and health perception (HP) with the SF-36 questionnaire in the Portuguese version were carried out. **Results:** On average, they have 73 years old (73,1 – M; 72,9 – W). More than a half (54%) of patients are married. They stay hospitalized, on average, for 7.2 days (7 – M; 6 W) and take an average of 8 medicines (7 – M; 8 – W). On average, they have BMI of 25,9 kg/m² (24.9 – M; 27.4 – W), 59,4% are overweight (BMI > 25 kg/m²), have FM percentage of 26.2% (22.9 – M; 35.1 – W), an amount of FFM of 30.7 kg (32 – M; 23.3 – W), HR of 82.2 bpm (79.8 – M; 85.4 – W), SBP of 128.5 mmHg (126.8 – M; 130.8 – W), DBP of 70.9 mmHg (72.7 – M; 69.6 – W) and HG of 17.9 kg (21.0 – M; 13 – W). The final score of SF-36 refers that the patients have an average HP (57,6), with M reporting a better health perception than W (62,4 vs 50,1) and according IPAQ 52% are considered active, 53.3% of elderly people are considered frail and 46.7% are considered pre-frail. Majority of patients (80%) consider important to include exercise physiologists in the SNS. **Conclusions:** This sample suggests that this type of population has a worrying fragility as well as poor PF, demonstrating some effects of aging on the health and function of this population.

Keywords: Physical Fitness, Anthropometric, Patients.

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22082 | Physical fitness, health perception and physical activity habits in a group of patients with different chronic non-communicable diseases

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Background & Aim: According to World Health Organization (WHO), 2018, Chronic Noncommunicable Diseases (NCDs) are considered one of the largest health and development threats of the 21st century. The aim of this study is to verify whether adult patients who attend the Outpatient Nutrition Consultation (ONC) can improve their levels of Body Composition (BC), Physical Activity (PA), Physical Fitness (PF) as well as Quality Of Life (QOL). **Methods:** This sample consists of 46 patients (15 men; 31 women) admitted in ONC. All the patients have an anthropometric assessment [Height (m), Body Mass (BM) (kg), Fat Mass (FM) (kg), Fat Free Mass (FFM) (kg), calculation of Body Mass Index (BMI) (kg/m^2), abdominal, hip, arm and leg circumferences (in cm)] an assessment of PF strength test of lower body resistance (sit and stand in 30 seconds) and an assessment of maximum upper limb strength (handgrip test in kg) as well as the filling of IPAQ questionnaire and WHOQOL-BREF. **Results:** On average, the sample has 43 years of age (43,9 – men; 42,8 - women). The BMI averages $33 \text{ kg}/\text{m}^2$ (34,4 – men; 32,4 – women) and 70,5 % has obesity ($\text{BMI} > 30 \text{ kg}/\text{m}^2$) (36,4 % - grade 1 obesity; 22,7 % - grade 2 obesity; 11,4 % - grade 3 obesity). On average they have a FM of 36,8 kg (36,9 - men; 36,8 - women) and a FFM of 31,2 kg (39,7 - men; 27,2 - women). According to WHO recommendations and IPAQ values 52,3 % of this sample appears to be active (57,1 - men; 50 - women) and only 15,2 % appears to recognize an Exercise Physiologist as a credible source to encourage them to exercise. Only 6,3 % of the valid percentage of this sample refers not take any kind of medicines and according to the WHOQOL-BREF score 67 (66,6 - men; 67,1 - women), the sample consider themselves to have a reasonably good health status. **Conclusions:** This sample suggests that despite a reasonable amount report having high levels of daily physical activity, there are still a large number of patients with obesity and associated comorbidities.

Keywords: Physical Fitness, Obesity, Patients.

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Apoio

