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Programa

Wednesday, February 17th

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10:15-11:00	Poster Session & Coffee Break	
11:00-13:00	Parallel Oral Sessions I A1 - Biological & Health Sciences: Dietary and Bioactive Compounds I A2 - Economics & Management A3 - Environmental Sciences & Technologies	p. 7 p. 15 p. 23
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Parallel Oral Sessions I

A1 Biological & Health Sciences: Dietary and Bioactive Compounds I

Degradation of anthocyanins and anthocyanidins in blueberry jams

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Blueberry (*Vaccinium corymbosum* L.) is reported to have a high content of anthocyanins. Thus, these fruits have received much attention due to their possible health benefits as dietary antioxidant, antimutagenic, and chemopreventive nutraceuticals [1]. However, anthocyanins are not stable; they are sensitive to temperature, especially above 70 °C. The rate of degradation of anthocyanins is time and temperature dependent, it has been shown to follow 1st-order kinetics [2]. The information of their degradation in jams is not well documented, since there is no study available providing information on fate of anthocyanins and anthocyanidins in blueberry fruit when submitted to heat, for example, when they are used to prepare jams. Nevertheless, the rate of anthocyanin degradation is associated with the rate at which the sugar is degraded. The aim of the present work was to investigate the degradation of anthocyanins and anthocyanidins in whole blueberries and blueberry jams, for that purpose the cultivar, Bluecrop was chosen.

Separation and quantification of anthocyanins and anthocyanidins were performed by liquid chromatography with diode array (HPLC-DAD) [3]. Ten anthocyanins were separated and monitored in methanolic extracts. These peaks were numbered by order of elution and peak areas were corrected to Units of area / g of blueberry dry matter. Analysis of anthocyanidins were performed after hydrolysis of methanolic extracts. The concentrations of anthocyanidins in fresh blueberries, heated fruits and jams were calculated using corresponding anthocyanidin standard calibration curves. Of the six common anthocyanidins, four were identified in the hydrolysates, namely, delphinidin, cyanidin, petunidin and malvidin. Percentage of degradation of anthocyanins and anthocyanidins in jams is highly dependent of °Brix and sugar addition. For lower heating times (15-20 min) and 64-76 °Brix the addition of sugar had a positive effect on the stability of anthocyanins and anthocyanidins when compared with heated fruits, however, for 80 °Brix, the stability decreased significantly. At higher °Brix anthocyanins were more susceptible to degradation.

In conclusion, anthocyanins and anthocyanidins from blueberries suffered different percentages of degradation at 100 °C depending on several factors, including structure of the compounds, heating time, sugars and their degradation products, ° Brix, among others.

[1] Seeram, N.P. (2008), *Berry Fruits for Cancer Prevention: Current Status and Future Prospects*, Journal of Agricultural and Food Chemistry, 56, 630–635.

[2] Kirca, A. and Cemeroglu, B. (2003), *Degradation kinetics of anthocyanins in blood orange juice and concentrate*, Food Chemistry. 81, 583–587.

[3] Queiroz, F., Oliveira, C., Pinho, O. and Ferreira, I. (2009), *Degradation of Anthocyanins and Anthocyanidins in Blueberry. Jams/Stuffed Fish*. Journal of Agricultural and Food Chemistry 2009, 57, 10712–10717.

Phytosterols profile of edible macroalgae

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Macroalgae are eukaryotic photosynthesizing multicellular organisms responsible for half of the O₂ production among the major primary producers. They have shown to constitute a rich source of bioactive compounds, being used as food and in industry. The investigation of new algal chemical compounds is also a promising area in pharmaceutical studies.

Eighteen seaweeds from the Portuguese coast (3 Chlorophyta, 5 Rhodophyta and 10 Phaeophyta species) were subjected to alkaline hydrolysis and studied for their phytosterols profile. Seven compounds were determined by HPLC-DAD (Fig. 1).

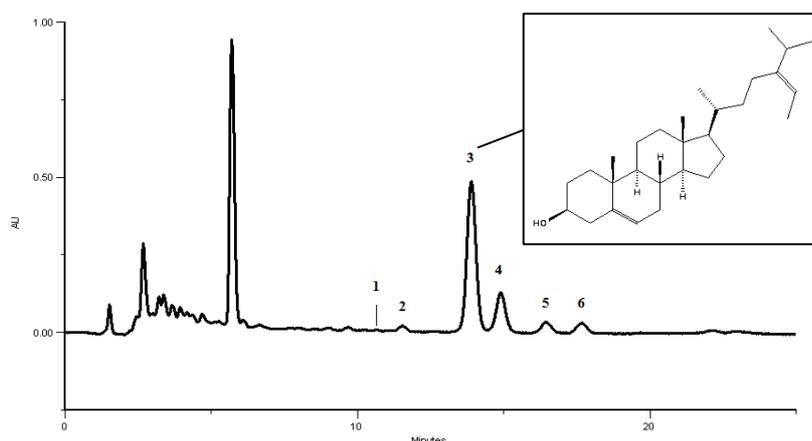


Fig. 1. HPLC-DAD chromatogram of the brown algae *Padina pavonica* (detection at 205nm). Peaks: desmosterol (1), ergosterol (2), fucosterol (3), cholesterol (4), stigmasterol + campesterol (5), β -sitosterol (6).

Method repeatability was good (1.7% variation coefficient for cholesterol), linearity was excellent for the examined fortification range, with 92% recovery for cholesterol.

Fucosterol was the predominant phytosterol in Phaeophyta and Chlorophyta (71-95% of total sterols determined), and cholesterol the main one in Rhodophyta (34-87% of total sterol content). The presence of fucosterol at low concentrations in Rhodophyta is characteristic of this phylum. From the studied algae, *Asparagopsis armata* contained the lowest amounts of phytosterols (555 mg/Kg dry weight) and *Cystoseira tamariscifolia* the highest one (6502 mg/Kg dry weight).

Acknowledgements:

G. Lopes (SFRH/BD/61565/2009) and J. Bernardo (BII) are indebted to Fundação para a Ciência e a Tecnologia (FCT) for their grants.

Bio-guided HPLC-PAD-APCI-MS metabolite profiling of cytotoxic carotenoids from the marine echinoderm *Marthasterias glacialis* (spiny sea-star)

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It is an undeniable fact that Nature constitutes one of the most expressive sources of bioactive compounds. Nowadays, the number of bioactive molecules from marine sources is rising, a trend that is thought to continue given the tremendous biodiversity of marine environment. As a result of the many challenges that these ecosystems present, including low temperatures, high pressures and low light availability, marine organisms respond by synthesizing a number of secondary metabolites, some of them with remarkable pharmacological properties.

In this work, the echinoderm *Marthasterias glacialis* (spiny sea-star) was studied from a metabolomic point of view (HPLC-DAD / HPLC-MS), which led to the isolation of several carotenoids, comprising both carotenes and xanthophylls (Fig.1). Some of these carotenoids, such as astaxanthin, are characteristic of the aquatic environment, being absent in terrestrial species. After a deeper chemical insight, we evaluated its cytotoxic activity against the cancer cell line RBL-2H3 (rat basophilic leukemia), with an IC₂₅ of 268 µg/ml being found.

Adding to the interest of these carotenoids as cytotoxic agents, the same compounds revealed much lower toxicity against healthy cells (V79 cell line, rat fibroblasts), thus being more specific for cancer cells.

This work shows how marine organisms can constitute an interesting source of bioactive compounds, due to their diversified chemistry, which we only now begin to understand.

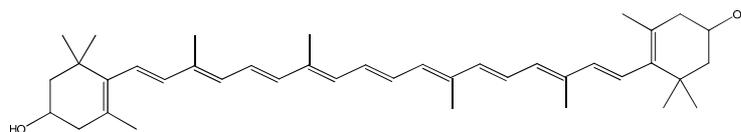


Fig. 1. *Marthasterias glacialis* and chemical structure of the main carotenoid (zeaxanthin).

Acknowledgements: David M. Pereira is indebted to FCT for the grant (SFRH/BD/62663/2009).

Quantification of Polycyclic Aromatic Hydrocarbons in barbecued meat by HPLC/Fluorescence

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Polycyclic aromatic hydrocarbons (PAHs) are a group of about 10,000 compounds, a few of which occur in considerable amounts in the environment and food. Due to their carcinogenic and mutagenic properties they are considered to be top of the list of the most hazardous substances. Human beings are exposed to PAHs via air and drinking water, but mostly by intake of food, especially, charcoal grilled and smoked meat [1].

The analysis of PAHs in food samples is hampered owing to their occurrence in food at microtrace levels, i.e. ppb or ppt levels and the co-extraction of interfering compounds present in the complex food matrices. Additionally, PAH are characterized by structural similarity and many occur as isomers, which again makes identification of individual compounds extremely difficult. Thus, the challenge for its analysts is to maximize recovery of analyte and minimize the accompanying interferences by proper extraction and clean-up procedures.

This work concerns the optimization of a method for determination of PAHs in barbecued meat by application of tandem solid-phase extraction (SPE) with columns filled with Extrelut diatomaceous earth, and column chromatography on silica gel for selective isolation of the 16 PAHs highlighted by the US Environmental Protection Agency (EPA). Identification and quantitative analysis of the individual compounds were achieved by HPLC/Fluorescence after separation on a C₁₈ column. Gradient elution was carried out with a mixture of three eluents: Eluent A was water/methanol (25:75), eluent B was methanol and eluent C was ethyl acetate. The following gradient was used: 0–18 min, 100-20% A and 0-80% B; 18-19 min 20-0% A and 80-100% B; 19-20 min 100-90% B and 0-10% C; 20-28.5 min 90-82% B and 10-18% C; 28.5-37.5min 82-80% B and 18-20% C; returning to initial conditions at 45 min and maintaining during 5 min., in a total run time of 50 min. The flow rate was 1.0 mL/min. These conditions are a good alternative to the use of acetonitrile in the HPLC mobile phase [2] since it is a less expensive solvent for monitorization of PAHs. Additionally, experiments were carried out to determine maximum fluorescence excitation and emission wavelengths, to improve detection limits. The multistep clean-up procedure optimized, based on tandem solid-phase extraction, in combination with the chromatographic conditions selected enabled an accurate and reproducible separation of PAH fractions from the cooked meat samples.

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- [2] Janoszka, B., Warzecha, L., Błaszczuk, U. and Bodzek, D. (2004), *Organic compounds formed in thermally treated high-protein food. Part I: polycyclic aromatic hydrocarbons*. Acta chromatographica, 14, 115-128.

The effect of temperature on total phenolics and antioxidant activity of New Zealand spinach (*Tetragonia tetragonioides*)

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A diet rich in vegetables may be protective against chronic diseases such as cancer and heart disease. These protective effects are mainly attributed to the presence of functional components, such as phenolic compounds. However, thermal treatments associated with food processing can alter the phenolic content of vegetables; yet, the biological properties associated with altered phenolic content have not been well delineated. Most of the vegetables are cooked by boiling in water before consumption. These cooking processes would bring about a number of changes in physical characteristics and chemical composition of vegetables [1,2,3]. According to literature, boiling and baking had a small effect on the ascorbic acid, total phenolic, and antioxidant activity, but Ismail *et al* pointed out that cooking affected the antioxidant components and antioxidant activity in all vegetables [4]. Two species of spinach are commercialised world-wide: *Spinacea oleracea* and *Tetragonia tetragonioides*. The first one scarcely grows at temperatures above 20°C, for that reason the former species, named New Zealand spinach is largely commercialized and very consumed in Portugal.

In this study, antiradical activity against DPPH[•] (expressed as IC₅₀), and total phenolic content (expressed as mg of gallic acid equivalents/g of methanolic extract—GAE/mg) of New Zealand spinach were determined in fresh leaves from different regions of Portugal and the influence of cooking time and temperature on these parameters was evaluated.

The IC₅₀ values of the methanolic extracts for raw spinach ranged between 155 and 319 µg/ml, and between 97 and 257 µg/ml for cooked spinach. Total phenolic content ranged between 27.98 and 42.55 mg GAE/g of extract. For spinach subjected to the cooking temperature of 100°C, losses of antiradical activity were found until 5 min of cooking time, after that period stabilization was observed. Concerning phenolic content, no significant changes were observed.

The results obtained in this study may be useful to food manufacturers in evaluating thermal processing technology for food quality and to consumers who wish to adopt cooking techniques that are consistent with preserving the ability of vegetables to deliver their maximum health benefits.

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[2] Sahlin, Z. and Hamauzu, (2004) *Phenolics, ascorbic acid, carotenoids and antioxidant activity of broccoli and their changes during conventional and microwave cooking*, Food Chemistry, 88 (4) 503-509

[3] Sahlin, E. et al (2004). *Investigation of the antioxidant properties of tomatoes after processing*, Journal of Food Composition and Analysis, 17 (5) 635–647.

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Effect of blueberry thermal processing on anthocyanins/anthocyanidins and antioxidant activity

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Blueberries are a rich source of anthocyanins. The potential health benefits of these compounds and the bittersweet taste of the fruit enhance consumer interest in using blueberries as an ingredient in thermally processed foods [1]. However, information of their stability during domestic cooking conditions and potential changes in antioxidant activity is not well documented, since there is no study available providing information on fate of anthocyanins and anthocyanidins in blueberry fruit when submitted to heat, for example, when whole blueberries are used in stuffed foods such as fish.

The aim of the present work was to investigate the effect of blueberry thermal processing on anthocyanins/anthocyanidins and antioxidant activity. For that purpose, blueberries (*Vaccinium corymbosum* L.) from three cultivars were chosen, Bluecrop, Bluetravel, Ozarkblue. Two batches of striped bass (*Morone saxatilis*) were stuffed with 40g of whole blueberries and cooked in an oven during 40 min at 200°C, the temperature achieved in the blueberries was around 100-102°C, after cooking blueberries were removed from fish. Separation and quantification of anthocyanins and anthocyanidins were performed by liquid chromatography with diode array (HPLC-DAD) [2]. Thirteen anthocyanins were separated and monitored in methanolic extracts. These peaks were numbered by order of elution. Analysis of anthocyanidins was performed after hydrolysis of methanolic extracts. Of the six common anthocyanidins, four were identified in the hydrolysates, namely, delphinidin, cyanidin, petunidin and malvidin. The antioxidant activity was evaluated with 2,2-diphenyl-1-picrylhydrazyl (DPPH).

As expected, for the three cultivars, anthocyanins of blueberries cooked in stuffed fish suffered extensive degradation, higher than 50%. Lower percentage of degradation was observed for anthocyanidins, probably because the whole fruit was protected from exterior ambient during cooking. However, antioxidant activity in blueberries appear to be heat stable since, in general, cooked berries presented higher inhibition percentage of DPPH* when compared with raw fruit. Cooked blueberries can be recommended as a good source of dietary antioxidants.

References:

- [1] Schmidt, B.M, Eerdman, J.W., Lila, M.A. (2005). Effects of food processing on blueberry antiproliferation and antioxidant activity. *J. Food Sci.* 70, 389-394.
- [2] Queiroz, F., Oliveira, C., Pinho, O. and Ferreira, I. (2009), *Degradation of Anthocyanins and Anthocyanidins in Blueberry. Jams/Stuffed Fish.* *Journal of Agricultural and Food Chemistry* 2009, 57, 10712–10717.



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Parallel Oral Sessions I

A2 Economics & Management

The third sector social innovation dynamics in the north of Portugal

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This ongoing project addresses the recent transformations in the field of social work and within social institutions that gave form to the concept of social innovation. The focus lies on the diverse Portuguese third sector, particularly on its dynamics in the north region.

The conviction that social actors' involvement on the projects that are designed for their benefit is a functional requirement, has been growing in the last decades, meaning that, the process of social work must move from *working for the people* to *working with the people*. At the same time, it aroused the understanding that organizations must come out of their walls in order to fully engage with society, for that is the only way to provide a fully integrated answer to social needs in a network society. The network tool has been applied and developed either in formal or informal ways, connecting various dimensions of social work, multiple geographical scales of activity and different sectors of the economy in promoting social inclusion and sustainable development. These are the main methodologies that the literature on *social innovation* refers to – *working with and not for the people* and *network cooperation* - two pillars of this research.

Social innovation is understood as a clear and significant change in the way a given society deals with a social problem. Its significance is measured by scale – number of people, geographical area involved, by scope – its capacity to affect multiple social dimensions, and by resonance – that is, the degree of intensity to which it attracts people's imagination (NILSSON, 2003).

The question that underlies this study is to know in which ways is social territorial development affected by the social innovation initiatives carried on within the third sector. The two pillars are related to the significance criteria forming a hypothetical framework that will serve as a filter for the empirical analysis.

The research approach will be of combined type, interviewing privileged informers to direct the approach to study cases according to the integration of the two pillars and the fulfillment of the criteria of significance. Qualitative interviews will be applied to multiple actors, amongst target population, organizational leaders, staff and volunteers, key-partners in the networks of cooperation, and community members.

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ANDRÉ, Isabel; ABREU, Alexandre (2006) - Dimensions and places of social innovation. *Finisterra*. XLI, 81. ISSN: 0430-5027.

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Social Entrepreneurship: An analysis through youth associations

Filipe A. Ribeiro, Ana N. Veloso, Artur V. Vieira

Entrepreneurship and entrepreneurs are attributed a number of characteristics, the development of which has been considered of top importance by the public authorities in most different countries. Although entrepreneurship, in its more current character - that is, the “commercial” one - is relatively well studied in literature, the social entrepreneurship still lies in an emergent phase, this justifying the existing deficient empiric evidence on this phenomenon. The purpose of this article is to contribute to add evidence to this reality, assessing, by means of a broad enquiry, addressed to the leaders of most Portuguese youth associations, in which way these associations bring an effective contribution for the creation and improvement of skills connected to entrepreneurship. From the obtained data and corresponding results, the conclusion is that youth associations play a determinant part in the development of the enterprising competences of their leaders. Based on a multivariable model, we proved that leaders consider their participation on associativism determining in the formation of their entrepreneur profile. In concrete, we can say that entrepreneurship attitudes are positively and considerably associated to the perception, by associative leaders, of the contribution that associations may bring to the improvement of their knowledge on management of organizations, legal system, performance of the markets. The entrepreneur leaders also recognize that associations increased the respective contact network in terms of business/market, providing them with a number of wider knowledge, and of practical applicability, than any subjects ever taught in their formal academic preparation. In terms of implications of educational politics, the conclusions strengthen the need of getting a larger integration between a formal and non-formal approach for the creation of theoretical and practical skills in the teaching of entrepreneurship on the most different levels. So, the formal recognition of the experience on association management, as a mean of curricular enrichment, would constitute an important improvement in the spirit of the future implementation and adoption of the European Qualification Framework.

Key-words: social entrepreneurship; youth associativism; Portugal

Are the ' entrepreneurs students' entrepreneurs of the future? The contribution of junior enterprises for entrepreneurship

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Few empirical studies have been done on social entrepreneurship, in particular, on the work done by individuals or organizations whose purpose is to provide solutions for social problems. Junior enterprises and students associations created within the higher education system, whose aim is to promote closer relations between academic students and businesses, stand as an example of such organizations. In recent decades the number of junior enterprises within the higher education system has increased significantly. Some argue that they act as true 'incubators' of talent and business, in a relatively small scale, which is adapted to the academic activities of the students involved. Existing literature on social and business entrepreneurship usually emphasizes, respectively, conceptual aspects and the enumeration of the characteristics of an individual with an entrepreneurial profile. Moreover, the literature on students' entrepreneurship targets in particular the role of education and training in entrepreneurship as a way to promote and enhance entrepreneurial attitudes in students.

The present study differs from the existing literature on its aim and scope, providing a complementary approach to the field. In concrete, we analyze, not how to instilling entrepreneurship through formal education or training, but instead, how the participation of students involved on junior enterprises contributes to the development of their potential and enhance, through the practice of action, adequate entrepreneurial characteristics. Thus, our aim is to understand to what extent the work of these organizations impact on students' entrepreneurial competencies, and as such the importance these organizations might have in the (informal) training of future entrepreneurs and CEO's. More specifically, we examine how the participation of students on junior enterprises increase their skills, namely regarding leadership, creativity and innovation, facilitating not only the admission (successful) in the labour market, potentially reflected in the occupation of managerial roles, but also encouraging the creation of new ventures.

To achieve these goals we implemented a direct survey to all former members of Fep Junior Consulting, a junior enterprise at Faculdade de Economia do Porto with 12 years of experience. Based on 44 responses of the 93 former members (response tax: 47,3%) we conclude that the participation in FJC develops entrepreneurship characteristics, with 50% of respondents revealing entrepreneurial characteristics (potential entrepreneurship) and 11,4% of the respondents answering that they had created their own enterprise (effective entrepreneurship).

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Characterisation of wine management on restaurants from the medium and high segments: an integrated approach.

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Despite the recognition of the importance of restaurants to the wine sector, of the harmonization between wine and food and the role of the wine list as a differentiating element of the restaurant, the literature reveals a reduced number of studies on the wine commercialization channel.

Thus, the central objective of the present master's dissertation consists on the characterization of wine management on medium and high segments of restaurants, responding to the following four questions: (i) What is the degree of involvement between restaurants and the wine?; (ii) How do restaurants manage the wine buying process?, (iii) How do restaurants internally manage the wines? and (iv) How do restaurants manage wine sales?

The degree of involvement, measured through the variables associated with the importance given to wine, allows us to characterize the impact of wine on the restaurants outcomes and the importance of the wine experience. A firms wine buyer's process is generally accepted as to be complex and the acquisition of wine by restaurant managers is influenced by specifications of the sector and product. The management of wine in restaurants is not limited to its storage and to table service but to all the actions that have impact on wine sales on the restaurant.

Other parameters such as the person responsible for the acquisition, the selection and evaluation of the suppliers and the management of the wine list must be analyzed. The wine sales in a restaurant are influenced by a diverse number of factors that can promote the wine sales and improve client satisfaction with the restaurant.

Methodologically it was decided to characterize this whole process in an integrated manner. To answer to the investigation questions, we, in collaboration with the magazine "Wine" interviewed restaurants and analyzed the answers to a structured questionnaire based on a sample of 54 Portuguese restaurants.

Some of the conclusions included that: (i) restaurants are highly involved with wine; (ii) wine suppliers present problems that could improve their relationship with restaurants and improve sales; (iii) the restaurants suggestion is the most powerful tool to promote wine sales on restaurants, in the restaurant manager's vision.

Subsequently the results of the present study allowed a better understanding of the restaurant wine management process and also permitted to suggest management actions and strategies regarding wine management.

Convergence of Accounting Practice Management

Adriana R. Silva¹, Dina Guimarães²

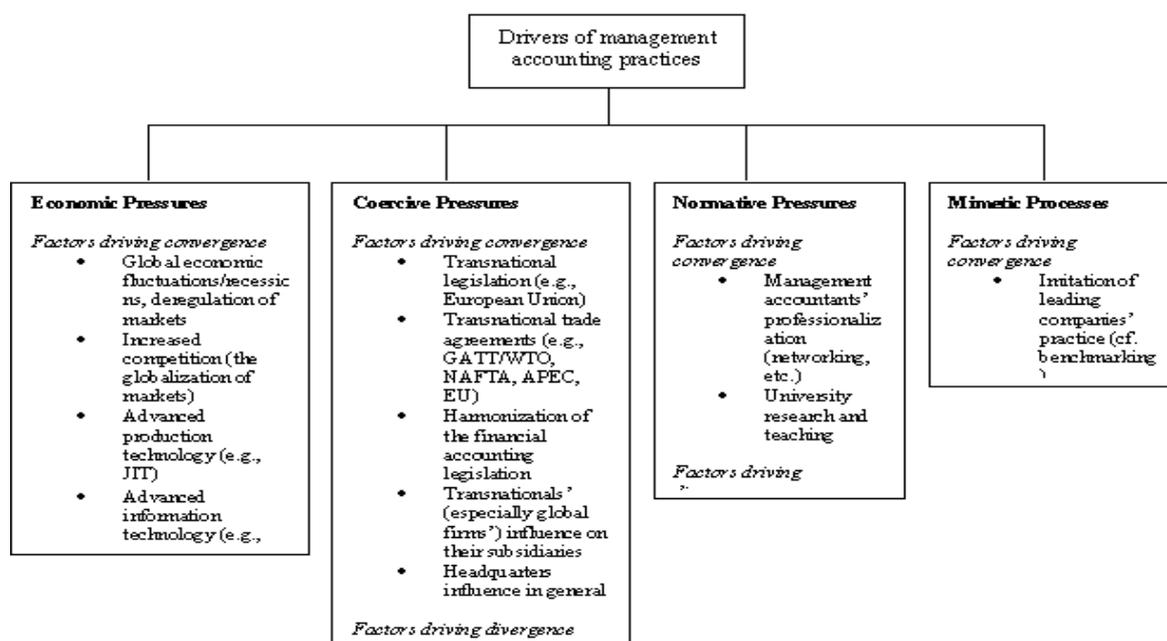
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In recent years, many companies have experienced significant changes in their organizational models, competitive environments and in information technology. According to several researchers, this change implies a need for an innovative accounting management. Bearing this in mind, this study seeks to present the importance of changing accounting practices, the main factors that influence this change and if there really is a need for such a change.

In the development of this project, we used literary review as our methodology. We managed to identify the convergences in accounting practices that seek to improve the quality of the information in the opinion of leading researchers in this area.

We reached the conclusion that unfortunately it is not an easy challenge, since there are major factors at the micro and macro level that cause interference:



Granlund and Lukka's

However, several researchers believe that the differences at the micro level are declining and that convergence will occur by the macro factors, since it is in these that there is a true global pressure for convergence.

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Parallel Oral Sessions I

A3 Environmental Sciences & Technologies

Ecological Assessment of Leça river:

Sediment and habitat study

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One of the main purposes of the European Water Framework Directive (WFD) is the establishment of standards for the ecological characterization and protection of all surface waters, towards the “good ecological status” of the systems. This classification is based on monitoring the ecosystems by using a multidisciplinary approach, and the yielded knowledge used to draw management and remediation strategies based on the river basin concept. This study was an assessment of the ecological status of habitats of the Leça River, in the north part of Portugal. Roughly half of its 50 km course, in the upstream stretch, is rural, being the remaining portion highly influenced by the densely populated Metropolitan Area of Porto. Sampling took place in June and July 2008, and the study included an assessment of benthic macroinvertebrate community and sediment characteristics, such as grain size, amount of organic matter, redox potencial, organic and metal toxicity and denitrification potential in eleven locations along the river. Data analysis was performed using PRIMER[®], PCA was used to analyze environmental data, MDS was used to analyze biological data, and BIO-ENV procedure was used to establish correlation between sediment characteristics and biological data. Also, the overall habitat status was evaluated using River Habitat Survey, a method for classifying rivers according to their habitat quality and modification. There was a clear distinction in the characteristics of sediment of upstream and downstream stations, revealing the growing organic contamination gradient towards the mouth. Those stretches presented the highest values for the environmental variables analyzed, namely organic matter, redox potential and organic toxicity, as well as the most similar benthic communities, dominated by highly pollution-resistant organisms. The results of the River Habitat Survey varied between “Very Poor” and “Poor” Habitat Quality and between “Semi-natural” and “Obviously Modified” status of the channel. The results show the need to implement a sustainable plan for the recovery of the river in the vein of the WFD.

Development of Monitoring Indicators of River Rehabilitation Processes - case study Rio Este, city of Braga

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Although rivers and streams have always been essential to the livelihood of populations, the increase of civilization's exploitation of water resources has historically produced a negative impact on stream corridors. Over time, interventions in rivers and streams were carried out according to interests that are now considered inadequate. Nowadays, a common interest in re-naturalizing the stream corridors seems to be arising, not only among the scientific community but also by both the population and politicians. The purpose of this investigation is to develop an evaluation methodology based on the analysis of a designed typology of indicators specific of fluvial rehabilitations.

The indicators were grouped into three subgroups: (i) General Project Indicators; (ii) Technical Characterization Indicators; and (iii) Assessment of the Measure Proposed Indicators.

A specific project on Rio Este (city of Braga) is presented to show the applicability of the proposed methodology, and it includes details of the evaluation procedure and further suggestions for implementation.

River rehabilitation is a complex process influenced by several factors such as ecological, environmental, biological, social and, eventually, political. Due to the complexity of this process the proposed methodology was based in a wide range of indicators. Due to its relevance and complexity, the technical characterization of this methodology is described in detail as it includes specific indicators that examine both the river basin as the segment of intervention.

The main objective of this research was to propose a specific evaluation methodology for river rehabilitation based on indicators and with practical applicability. This work is aimed to contribute to: (i) fluvial rehabilitation enhancement and development in Portugal; and (ii) to the achievement of the Water Framework Directive goals as well as to the continuous and sustained development of the ecological status of Portuguese stream corridors.

***Chlorella vulgaris* for Wastewater Treatment and Lipid Production**

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This study aims to analyze the effectiveness of using microalgae *Chlorella vulgaris* for wastewater treatment and lipid production. The choice of this microalgae specie was done after a careful literature revision, due to its high biomass growth rate and its easy adaptation to be grown in open ponds. The origin of the wastewater to be treated is the dairy industry. Few studies have been done concerning microalgae growth in this type of effluent, which can be treated using microalgae due to its high rate of biodegradability [1-3]. After treatment, the algal biomass must be separated from the treated effluent and its lipids can be then extracted for biodiesel production [4].

It should be noted that the dairy effluent studied was not collected from a dairy industry but simulated in laboratory. The reason for this is that the characteristics of a dairy effluent vary widely, making it difficult or even impossible to perform the analysis. For this reason, a simulated dairy wastewater was prepared by mixing different amounts of milk and de-ionized water in order to prepare one liter of final solution. The amounts of milk used are 4, 8, 12, and 20mL. Additionally, other one liter solutions were prepared using the same volumes of milk, but also adding to the culture medium some nutrients normally used for microalgae growth.

This way it was possible to determine the more adequate mix of milk and water and if other nutrients are required in the culture medium for an efficient wastewater treatment and microalgae growth. Results of this study allows one to compare which is the best culture medium for microalgae and to relate the amount of milk or nutrients added and the algal biomass growth, which is measured by absorbance using a spectrophotometer UV visible. Results also showed that the better volume of milk is around 12mL with or without the addition of extra nutrients.

References:

- [1] Woertz I., Feffer A., Lundquist T., Nelson Y. Algae Grown on Dairy and Municipal Wastewater for Simultaneous Nutrient Removal and Lipid Production for Biofuel Feedstock. *Journal of Environmental Engineering* 2009, 1 115-1122.
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Environmental Remediation of Pesticides by Integrating the Photo-Fenton Process and Weed Plants

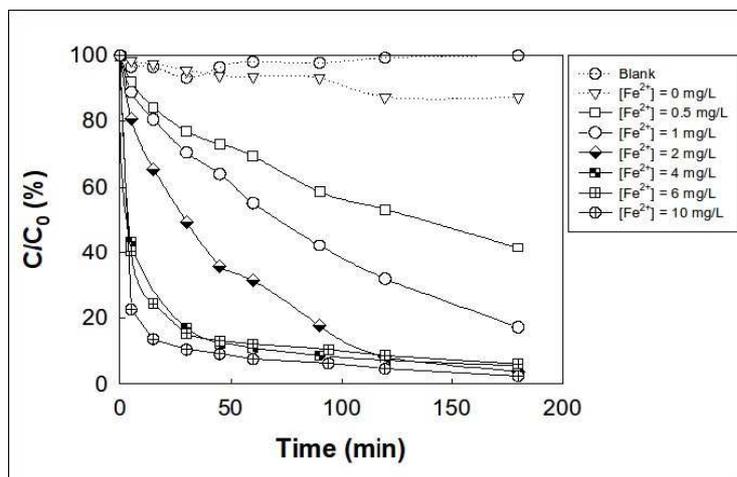
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This work aims to investigate an innovative strategy to combine the unique advantages of the photo-Fenton treatment with the phytoremediation. The photocatalytic process decreases the organic content of a solution containing a commercially available pesticide (Ridomil – active compound - metalaxyl), while it is expected that in a subsequent step *S. nigrum* plants will retain and/or extract the iron-species and eliminate the inorganic nitrogen species (e.g., NH_4^+ , NO_3^-) released with the treated effluent [1]. Firstly, the degradation of the pesticide was studied using the photo-Fenton process in a batch photoreactor, varying the concentration of iron (Fe^{2+}) and hydrogen peroxide (H_2O_2) under irradiation with UVA and visible light. The highly reactive hydroxyl radicals produced react with the organic pollutants contained in the pesticide solution and the concentration of these pollutants was monitored using HPLC and TOC analysis. As example, Fig.1 illustrates the metalaxyl ($C_0 = 151 \text{ mg/L}$) degradation for different initial concentrations of Fe^{2+} . This compound is quite stable when Fe^{2+} was not used; however, the degradation of this pollutant increases with the Fe^{2+} concentration up to an iron load of 4 mg/L and is not significantly enhanced for higher Fe^{2+} concentrations. The initial photo-Fenton conditions were established and further studies will be now carried out integrating both chemical and biological treatments.

Figure 1. Degradation vs. time decay curves of metalaxyl during the photo-Fenton experiments using



different Fe^{2+} contents and 80 mg/L of H_2O_2 . Blank: $[\text{Fe}^{2+}] = 0 \text{ mg/L}$; $[\text{H}_2\text{O}_2] = 0 \text{ mg/L}$.

Acknowledgements: The authors gratefully acknowledge the Universidade do Porto for financial support (projecto pluridisciplinar PhotoWeed), with the contribution of Santander Totta.

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Decontamination of cork bleaching wastewater by solar-photo-Fenton process without H₂O₂ addition

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Presently, there are approximately 800 cork industrial facilities operating in Portugal, employing a labour force of about 12,000 people, which makes it a world leader in the cork industry [1]. The main goal of this work is to study the treatment of cork bleaching wastewater by advanced oxidation processes (AOPs), using natural sunlight as UV radiation source.

The cork bleaching wastewater is produced during the cleaning and disinfection of the cork stoppers, and presents an intense yellow colour, a significant concentration of organic carbon (DOC = 273 mg/L) and an alkaline pH (9.3). The high concentration of hydrogen peroxide (≈ 5.6 g/L) allows its utilization as reactant in the Fenton reaction, thereby making the application of a photo-Fenton treatment easier. The use of heterogeneous photocatalysis for the treatment of this kind of wastewater has already been tested [2], yielding much worse results than the photo-Fenton process.

The photo-Fenton experiment was carried out in a pilot plant at the Faculty of Engineering, University of Porto (FEUP) consisting in a unit of compound parabolic collectors (CPCs) (0.91 m²), a storage tank (20 L), a recirculation pump (20 L min⁻¹) and connecting tubing, being operated in batch mode. The CPCs have 4 borosilicate tubes connected by plastic junctions and are tilted 41° local latitude. The intensity of solar UV radiation was measured by a global UV radiometer (ACADUS 85-PLS) mounted on the pilot plant at the same angle.

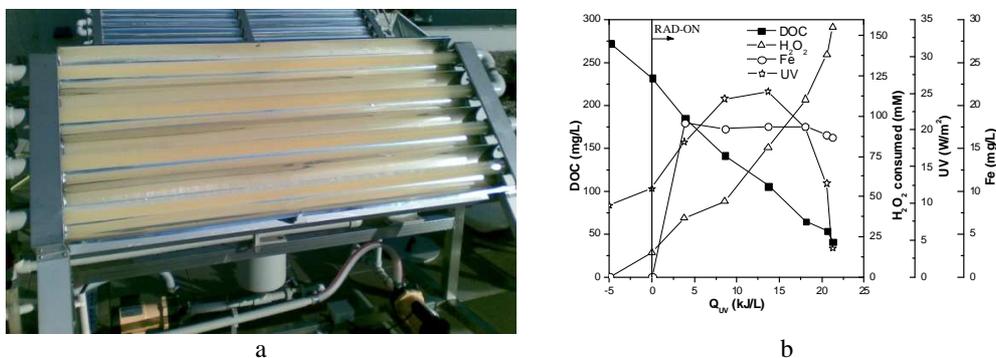


Fig. 1 (a) Solar photoreactor; (b) Mineralization of cork bleaching wastewater, H₂O₂ consumed, UV radiation intensity and Fe concentration during photo-Fenton reaction.

The DOC degradation curve shows a zero-order kinetic behaviour (linear correlation with the UV energy accumulated) ($k=r_0=9.1$ mg/kJ_{UV}) using an initial iron concentration of 20 mg/L. The H₂O₂ consumption rate is also constant ($k_{H_2O_2}=5.7$ mmol H₂O₂/kJ_{UV}). However, it should be pointed out that there was an excess H₂O₂ being consumed in the reaction, which suggests further improvements in the process efficiency.

References:

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- [2] Vilar, V. J. P. et al.; Solar treatment of cork boiling and bleaching wastewaters in a pilot plant; *Water Research* **43** (2009); pp. 4050-4062.

Degradation of the herbicide Paraquat by Fenton's reagent

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Paraquat is a quaternarium ammonium salt herbicide which IUPAC name is 1,1-dimethyl-4,4'-bipyridiondichloride. This compound is widely used for broadleaf weed control, as crop desiccant and defoliant, and as an aquatic herbicide. Its toxic character is due to lipid peroxidation by generation of free radicals that are involved in the initiation of membrane damage. On the other hand, paraquat molecule is very persistent in the environment; then, there is a high risk of water/wastewater contamination. The European Union banned the use of Paraquat although in others continents its use has been allowed. Therefore, there is the need of effective technologies able to degrade paraquat in water matrices.

The advanced oxidation processes (AOP's) are clean technologies and have proven highly effective in the degradation of many substances. They involve the formation of hydroxyl radicals ($\bullet\text{OH}$), which are very reactive, non-selective and capable of degrading a large number of organic compounds. Fenton's oxidation is an example of AOP's which use iron (Fe^{2+}) as catalyst and hydrogen peroxide as source of the radicals. The main reactions involved in the Fenton's process are the following:



The aim of this work is the treatment of water contaminated with paraquat by Fenton's oxidation. For that a parametric study was performed to find the conditions that give the best percentage of mineralization, i.e. Total Organic Carbon (TOC) reduction, aiming this way to degrade both paraquat and intermediate oxidation by-products. Experiments were performed in a batch reactor with temperature control, being the pH and temperature monitored along the reaction. During the process some samples were collected at specific time intervals and the reaction stopped with sodium sulfite (which instantaneously consumes residual H_2O_2). The samples were analyzed in a Shimadzu 5000A TOC analyzer. Mineralization degrees above 50-60% were reached in less than 4h, which point for the effective use of this AOP in paraquat oxidation.

Degradation of *Sirius*[®] Blue dye by TiO₂ solar photocatalysis

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Generally, over 10% of the textile dyes are lost in wastewater stream during their synthesis and dyeing processes and often cause environmental problems [1]. The main purpose of this work was to evaluate the decolourization and mineralization of a direct blue textile dye, *Sirius*[®] Blue K-CFN from *DyStar*, by a heterogeneous photocatalytic process with TiO₂, using solar radiation as UV photon source.

The photocatalytic experiments were carried out in a pilot plant constituted by compound parabolic collectors (CPCs) (0.91 m²), two storage tanks (10 and 20 L), two recirculation pumps (20 L min⁻¹) and connecting tubing, being operated in batch mode. The CPCs have 4 borosilicate tubes connected by plastic junctions and tilted 41° local latitude. The pilot plant can be operated in two ways: using the total CPCs area (0.92 m²) or using 0.46 m² of CPCs area individually (used in this work). The intensity of solar UV radiation is measured by a global UV radiometer (ACADUS 85-PLS) mounted on the pilot plant at the same angle.

It was observed 30% decolourization of the dye solution after the addition of TiO₂, due to the dye adsorption on the surface of the catalyst. The solar photocatalytic reaction, using 200 mg TiO₂/L, leads to complete decolourization and mineralization and 100% reduction of aromatic content after 2.5 days solar exposure (120 kJ_{UV} L⁻¹). Fig. 1 shows the evolution of colour of the solution, starting from an intense blue coloured solution, passing to a marine blue colour and finally to a white coloured solution, which is due to the TiO₂ white particles.

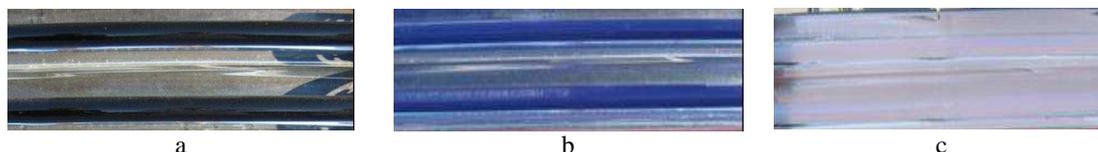


Fig. 1 (a,b,c) Evolution of colour during phototreatment.

The decolourization reaction rate follows a zero-order-kinetic behaviour, with a kinetic constant (k) and initial reaction rate (r_o) of 0.72 mg/kJ_{UV}. The mineralization rate presents an initial slow reaction rate until total decolourization is achieved, followed by a first-order kinetic behaviour ($k = 0.005$ L/kJ_{UV}, $r_o = 0.084$ mg/kJ_{UV}) until 80 kJ_{UV}/L and, finally a faster reaction rate ($k = 0.084$ L/kJ_{UV}, $r_o = 1.39$ mg/kJ_{UV}) until 120 kJ_{UV}/L. A pH reduction was observed in the range 40-95 kJ_{UV}/L due to molecule dye cleavage and consequently formation of acid low-molecular-weight carboxylic intermediate compounds, resulting in a decrease of the absorbance at 254 nm. Experiments were performed in consecutive days, so temperature rises from morning start-up (20°C) to an almost constant value (38.5 °C was the maximum temperature achieved) and decreases again during the afternoon, depending on the sunlight intensity.

References:

[1] Forgacs E., Cserhati T., Oros G. (2004), *Removal of synthetic dyes from wastewaters: a review*, *Env. Int.* 30 (7), 953–971.

Solar photocatalytic decolourization of direct *Sirius*[®]*Rubine* dye with TiO₂

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Textile dyeing is a significant consumer of water and producer of contaminated aqueous waste streams [1]. The main objective of this work was to evaluate the decolourization and mineralization of a direct red textile dye, *Sirius*[®]*Rubine K-2BL* from *DyStar*, by a heterogeneous photocatalytic process with TiO₂ using solar radiation as UV photon source.

The photocatalytic experiments were carried out in a pilot plant consisting in a unit of compound parabolic collectors (CPCs) (0.91 m²), two storage tanks (10 and 20 L), two recirculation pumps (20 L min⁻¹) and connecting tubing, being operated in batch mode. The CPCs have 4 borosilicate tubes connected by plastic junctions and tilted 41° local latitude. The pilot plant can be operated in two ways: using the total CPCs area (0.92 m²) or using 0.46 m² of CPCs area individually (used in this work). The intensity of solar UV radiation is measured by a global UV radiometer (ACADUS 85-PLS) mounted on the pilot plant at the same angle.

It was observed 16% decolourization of the dye solution after the addition of TiO₂, due to the dye adsorption on the surface of the catalyst. The solar photocatalytic reaction, using 200 mg TiO₂/L, leads to complete decolourization, 83% mineralization and, 100% reduction of aromatic content after 5.5 days solar exposure (265 kJ_{UV}/L). Fig. 1 shows the evolution of colour of the solution, starting from an intense red coloured solution, passing to a pink colour and finally to a white coloured solution, which is due to the TiO₂ white particles. The UV-Vis absorption spectrum was performed at different solar energy doses, showing that the red dye presents a maximum absorption peak at 532 nm, which disappearance during phototreatment suggests that the chromophore groups responsible for the colour are breaking down.

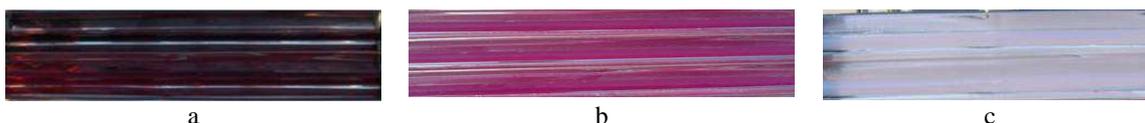


Fig. 1 (a,b,c) Evolution of colour during phototreatment.

The decolourization reaction follows a zero-order-kinetic behaviour, with a kinetic constant (k) and initial reaction rate (r_o) of 0.42 mg/kJ_{UV}. The mineralization rate presents an initial induction time of 122 kJ_{UV} /L before DOC abatement due to partial oxidation of organics, followed by a faster reaction rate, showing a first-order-kinetic behaviour ($k = 0.012$ L/kJ_{UV}, $r_o = 0.15$ mg/kJ_{UV}) until 265 kJ_{UV}/L. Solar photocatalysis is a promising alternative process for textile wastewater decolouration, since it can be easily and efficiently applied and employs the solar radiation as main energy source.

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- [1] Forgacs E., Cserhati T., Oros G. (2004), *Removal of synthetic dyes from wastewaters: a review*, *Env. Int.* 30 (7), 953–971.



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Parallel Oral Sessions II

A1 Biological & Health Sciences: Physiology I

ATF-3 expression during inflammatory pain, in primary afferent neurons

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Background and aims: ATF-3 is a member of the ATF/CREB (activating transcription factor/cAMP responsive element binding protein) transcriptional factors family and its expression has been associated to cellular stress response, anti and pro- apoptosis mechanisms, survival phenomenon and neuropathic pain. ATF-3 has been suggested as an “adaptive response”, as it can decide the cell destiny, according to different stimulus and cellular context. Here we aimed to study the disease progression and the associated expression of ATF-3 in primary afferent neurons over time in a well established model of chronic inflammatory pain.

Methods: The monoarthritis (MA) model induced by injection of CFA (Complete Freud’s Adjuvant) in the tibiotarsal joint was used. Immunohistochemistry against ATF-3 at timepoints 2, 4, 7 and 14 days post-CFA injection was performed in ipsi- and contralateral L₃, L₄ and L₅ Dorsal Root Ganglions (DRGs). Control rats were injected with saline or vehicle and sacrificed after 2 days.

Results: Expression of ATF-3 was significantly increased at 2 and 4 days of MA, but it started diminishing after that period although in 7 and 14 days MA was still higher than controls. Rises were more considerable in L₅. Control DRGs showed no significant ATF-3 expression.

Conclusion: Data suggest ATF-3 expression, at early timepoints, is involved in the inflammatory pain process, at the periphery. Further studies are necessary to clarify the ATF-3 signaling pathways associated to this condition and the underlying mechanisms that contribute to this particular expression pattern.

Urocortin 2 acute effects on the diastolic properties of the myocardium

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The urocortin (Ucn) peptides are recent isolated members of the highly conserved corticotrophin-releasing factor (CRF) family [1-2]. Ucn2 enhances contractility via CRF2 receptor-mediated stimulation of protein kinase (PK) A. As PKA is a well known modulator of diastolic function, we investigated the acute effects of Ucn2 on myocardial diastolic properties.

The effects of increasing concentrations of Ucn2 (10^{-10} to 10^{-6} M) were evaluated in right ventricular papillary muscles isolated from male New Zealand White rabbits (Krebs-Ringer: 1,8mM CaCl₂, 35°C), in the presence (n=12) and in the absence of: (i) PKA inhibitor (H89, 10^{-6} M, n=9) or (ii) PKC inhibitor (Chelerythrine, 10^{-5} M, n=9). Reported parameters include passive tension (PT; mN/mm²) and muscle length (L; L/Lmax). Ucn2 induced a concentration-dependent increase in resting muscle length up to 1.012 ± 0.004 L/Lmax at 10^{-6} M. Correcting muscle length to its initial value resulted in a $29.6 \pm 8.9\%$ decrease of PT, indicating a decrease in muscle stiffness. This effect was attenuated in the presence of either PKA or PKC inhibitor. Ucn2 (10^{-6} M) induced an increase in resting muscle length of 1.005 ± 0.002 L/Lmax, in the presence of H89, and of 1.006 ± 0.002 L/Lmax in the presence of Chelerythrine, corresponding to a decrease of PT of only $11.0 \pm 4.0\%$, and $13.3 \pm 6.4\%$, respectively.

Ucn2 acutely decreases myocardial stiffness, an effect dependent on PKA and PKC activation. This is a potentially powerful physiologic mechanism, as it may allow the heart to reach the same diastolic volume with up to 30% lower filling pressures. These findings reinforce the relevance of Ucn2 in the pathophysiology of heart diseases and also its potential clinical importance.

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Hemodynamic and morphometric characterization of a new experimental model of paediatric pulmonary hypertension (PH)

M. Ferreira-Pinto¹, M. Dias-Neto¹, A. Luísa-Neves¹, N. Gonçalves¹, C. Eloy², J. M. Lopes², T. Henriques-Coelho¹ and A. F. Leite-Moreira¹

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Introduction: Pediatric PH presents certain specific features, however there is a lack of experimental models for the study of the physiopathology of PH in this specific age group. Rabinovitch et al[1] described an infantile model of PH induced by a Monocrotaline (MCT, 60mg/Kg) injection in rats with a very low survival rate.

Objective: To characterize the hemodynamic and morphometric progression of PH induced by a lower dose of MCT in an infantile model.

Methods: 8-day-old Wistar rats were randomly injected with MCT (30mg/Kg, subcutaneous) – MCT group – or equal volume of saline solution – SF group. On days D7 (SF=6; MCT=5), D14 (SF=6; MCT=8) and D21 (SF=6; MCT=5) after treatment, animals were anesthetized, mechanically ventilated by tracheostomy and biventricular hemodynamic parameters were obtained using conductance catheters positioned on right (RV) and left ventricular (LV) cavities after exposure of the heart. Additionally, on days D7, D14 e D21, the lungs and hearts were weighted for morphometric characterization (n= 5-11 per group) or collected, fixated, cut and stained with Sirius Red for assessment of the collagen type I and type III ratio (n=3-5 per group).

Results: the results are presented on table 1 as mean \pm SD; ^a vs SF, p<0,05.

	D7		D14		D21	
	SF	MCT	SF	MCT	SF	MCT
Body weight (g)	30,63 \pm 1,44	31,09 \pm3,44	48,29 \pm 3,12	45,07 \pm5,83	84,57 \pm 5,22	82,78 \pm11,03
RV/(LV+S) (g/g)	0,45 \pm 0,11	0,57 \pm0,06^a	0,38 \pm 0,04	0,53 \pm0,10^a	0,36 \pm 0,06	0,67 \pm0,15^a
Collagen type I/type III RV	2,06 \pm 2,11	0,59 \pm0,82	0,83 \pm 0,69	2,80 \pm2,89	3,11 \pm 2,33	1,64 \pm1,07
Heart rate (bpm)	376,42 \pm 42,41	385,27 \pm54,87	382,18 \pm 37,51	360,14 \pm85,87	410,17 \pm 44,95	396,18 \pm53,99
RV Pmax (mmHg)	44,96 \pm 16,28	36,25 \pm9,78	27,94 \pm 7,09	27,94 \pm12,30	28,52 \pm 6,79	56,70 \pm16,41^a
LV Pmax (mmHg)	68.0 \pm 4,68	61.7 \pm4,50	69.8 \pm 6,36	65.7 \pm6,86	66.4 \pm 6,07	67.3 \pm5,17

Conclusion: Animals treated with MCT at the 8th day of life presented right ventricle hypertrophy since day 7. We found no differences on the collagen type I and type III ratio. The first hemodynamic evidences of PH appeared on day 21. This model could be useful in the study of the physiopathology of pediatric PH.

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Re-admission of facilitatory adenosine A_{2A} tonus regulating ACh release by AMP in toxin-induced *Myasthenia gravis*

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At the neuromuscular junction, adenosine can either be released as such or can be formed upon the sequential extracellular catabolism of released adenine nucleotides (e.g. ATP) [1]. Which adenosine receptor (inhibitory A₁ vs. facilitatory A_{2A}) is predominantly activated is apparently determined by the differential contribution of these two main pathways leading to extracellular adenosine accumulation [1]. Recently, our group presented evidence supporting the hypotheses that tonic adenosine receptors activity is compromised in a toxin-induced model of *Myasthenia gravis* (TIMG) due to reduced synaptic levels of the nucleoside [2]. Considering the evidence that tonic activation of adenosine A_{2A} receptors may contribute to overcome tetanic depression during neuronal firing in healthy rats [3] and that adenosine originated from the catabolism of released adenine nucleotides preferentially activates excitatory A_{2A} receptors in phrenic motor nerve endings [4], the manipulation of adenosine A_{2A} receptors may assume a key target to manage neuromuscular transmission impairment, such as observed in *Myasthenia gravis*. This prompted us to evaluate the effect of the exogenously applied nucleoside precursor, AMP (30-100 μM), as well as adenosine, on [³H]-ACh release from stimulated (5 Hz, 750 pulses) motor nerve terminals using TIMG animals as compared to control littermates. We also investigated the effect of AMP (30-100 μM) on TIMG animals performing real-time measurements of exocytosis by video-microscopy using the membrane-selective FM 4-64 fluorescent dye. The time course of adenosine and adenine nucleotides metabolism and product formation determined by HPLC analysis, was also determined.

The maximum inhibitory effect caused by exogenously applied adenosine was maintained, but the concentration-response curve of the nucleoside (0.010-1 mM) was shifted to the right in TIMG animals. In contrast to control rats, adenosine failed to facilitate evoked [³H]-ACh release in TIMG animals, indicating that in myasthenics adenosine cannot reach the threshold to activate A_{2A} receptors. Moreover, kinetic HPLC studies revealed a significant (P<0.05) increase in ecto-ADA activity in TIMG rats compared to controls, since adenosine (30 μM) half-degradation time was increased from 32±11 min (n=5) to 59±13 min (n=3), respectively. Despite the fact that AMP extracellular catabolism remained virtually unchanged in TIMG rats, the facilitatory effect of the nucleotide (30 μM, 54±12%, n=10) observed in control preparations was absent in the myasthenic model. A clear A_{2A} receptor-mediated facilitatory action (35±14 %, n=5) was only achieved in TIMG animals by increasing the concentration of AMP to 100 μM. A similar profile was observed in the exocytosis experiments when phrenic nerve hemidiaphragms were incubated with the adenosine precursor, AMP (100 μM).

Data suggests that A_{2A}-receptor-mediated facilitation of transmitter release may be re-admitted in TIMG rats by increasing synaptic adenosine formation from the catabolism of extracellular AMP.

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Nicotinic modulation of cholinergic neurotransmission in the electric organ of *Torpedo marmorata*

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This study focuses on the mechanisms involved in the modulation of cholinergic neurotransmission by presynaptic nicotinic autoreceptors (nAChRs) in the electric organ of *Torpedo marmorata*. Studies performed at the rat motor endplate demonstrated that acetylcholine (ACh) enhance its own release during a period of repetitive nerve activity by activating nAChRs. This mechanism may operate as a presynaptic amplifier to increase the safety factor of neuromuscular transmission. Measuring [³H]-ACh release, electrophysiological signals and mechanical tension in the presence of subtype selective nicotinic antagonists, we demonstrated the presence of $\alpha_3\beta_2$ -containing neuronal nAChRs mediating facilitation of ACh release in addition to the classical nicotinic receptors containing the α_1 subunit on the skeletal muscle fibres [1,2]. In this work, *Torpedo marmorata*'s electric organ electrocytes were used as real time detectors of ACh release by measuring compound evoked electroplaque potentials (EPP) in single stacks of electrocytes (prisms). These potentials result from the synchronized release of ACh, from a myriad of synapses, allowing the study of nicotinic neuromodulation with submillisecond resolution. The effect of a bathing application of the nAChR agonist, 1,1-dimethyl-4-phenylpiperazinium iodide (DMPP), on prism electric potential was evaluated. DMPP concentration-dependently increased the amplitude (~20-30%) and the area (~43%) of EPPs (n=10). The effect of DMPP (0.1-10 μ M) on prism amplitude and area rose upon lowering extracellular calcium from 3.4 mM (normal physiological concentration in the Torpedo) to 1.7, 1.275 and 0.85 mM. Time parameters were less sensitive to calcium decrease perhaps because they are virtually independent from receptor field saturation while the amplitude and area are not. Endogenous facilitation was reverted with the nicotinic receptor antagonists, dihydro-beta-erythroidine (DH- β -E) and hexamethonium (HE). In order to assess if DMPP action on electric responses was pre- or post-synaptic, we blocked prism impulse conduction with TTX (1 μ M) and inhibited acetylcholinesterase activity with neostigmine (20 μ M). Under these conditions, bath applied ACh (100 μ M) was able to evoke postsynaptic potentials higher than 100 mV for a few seconds, while DMPP (100 μ M) was not (n=4), thus indicating that DMPP facilitates ACh release rather than a post-synaptic response of prisms. To confirm this, synaptosomes from *Torpedo* electric organ were isolated where we evaluated ACh release directly by chemiluminescence. DMPP raised the amount of ACh release (~30%) induced with veratridine (100 μ M) and KCl (40 mM), thereby confirming the pre-synaptic nature of its effect. In this preparation the $\alpha_{3/4}\beta_2$ nAChR antagonist, dihydro-beta-erythroidine (DH- β -E, 3 μ M), was incubated, in order to further characterize the nAChR subtype(s) involved in DMPP facilitation. Preliminary results indicate that DMPP facilitation was significantly attenuated by DH- β -E. Incubating prisms with BAPTA-AM or EGTA-AM, exposed the spatial relationship between pre-synaptic nAChR and the calcium sensors (responsible for ACh release), thus evidencing that they are not co-localized.

To our knowledge, this is the first attempt to investigate the role of pre-synaptic nAChRs in the electric organ of *Torpedo marmorata*. Further assays are programmed to further characterize the nature of the nAChR activated by DMPP and to establish its mode of action on *Torpedo* electric organ rapid synapses.

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Interaction of purinergic, tachykinergic and muscarinic receptors on a tripartite myenteric synapse

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The enteric nervous system (ENS) has a vast number of non-neuronal glial and interstitial cells of Cajal localized both at the myenteric (ICC-MP) and the deep muscular plexus (ICC-DMP), which function together with neurons to control gastrointestinal physiology. Enteric motility relies on the release of acetylcholine (ACh), tachykinins (e.g. substance P) and purines (e.g. ATP and adenosine) from enteric motoneurons [1]. Recently, we showed that muscarinic receptors facilitate ACh release indirectly by increasing adenosine outflow leading to the activation of excitatory adenosine A_{2A} receptors on enteric nerve terminals [3]. Tachykinergic NK₁ and muscarinic M₃ receptors decorate ICC-DMP [2] localized in close apposition between enteric nerve terminals and smooth muscle fibers - *tripartite synapse*. In spite of this, little is known about the crosstalk between purinergic, tachykinergic and muscarinic receptors in controlling synaptic transmission in the myenteric plexus.

The experiments were performed in the longitudinal muscle-myenteric plexus (LM-MP) of the ileum of Wistar rats from a control group (C) and from a group of animals treated with capsaicin in the neonatal period (CAP), which selectively eliminates (>95%) peptidergic nerve fibers. In this study, we measured the release of [³H]-ACh and substance P (SP) by liquid scintillation spectrometry and ELISA, respectively. Smooth muscle tension was evaluated after applying oxotremorine (Oxo, a muscarinic M₃ agonist). Co-localization experiments were performed by immunofluorescence using a laser-scanning confocal microscope.

The muscarinic agonist, Oxo (300 μM), and the selective adenosine A_{2A} agonist, CGS21680C (3 nM), increased the electrically-evoked (5 Hz, 200 pulses) released of [³H]-ACh (but not of SP) from myenteric nerve terminals respectively by 34±4% (n=5) and by 53±10% (n=5) in C rats; these drugs were devoid of effect in CAP animals. Selective activation of NK₁ receptors with s,m-SP (300 nM) restored CGS21680C facilitation (46±17%, n=6) of [³H]-ACh release to control levels in CAP rats. Synergism between A_{2A} and NK₁ receptors was confirmed using selective antagonists of NK₁ (L732128, 20 nM) and A_{2A} (ZM241385, 50 nM) receptors. Blockade of muscarinic M₃ receptors with J107129 (6 nM) failed to attenuate the contractile responses of Oxo (0.003-300 μM) in CAP animals, but it significantly (P<0.05) shifted to the right the concentration-response curve of Oxo in C rats. We confirmed that muscarinic M₃ and NK₁ receptors immunoreactivity co-localize on ICC-DMP, while adenosine A_{2A} receptors are mainly expressed on cholinergic nerve terminals. CAP rats exhibit decreased M₃ receptor immunoreactivity, along with a reduction in the number of SP positive nerve fibers. Data demonstrate that NK₁ receptors interact synergistically with A_{2A}, but not with M₃, receptors to control ACh release from myenteric nerve terminals. Downregulation of muscarinic M₃ receptors on ICC-DMP, might explain why CAP rats exhibit reduced levels of adenosine (Marques *et al.*, unpublished observations) leading to impairment of tonic A_{2A} receptor activation.

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Parallel Oral Sessions II

A2 Philosophy, Ethics & Political Sciences

Gender Politics and its relation to HIV/AIDS in Africa

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This paper will seek to show that the overwhelmingly heterosexual transmission of HIV/AIDS allows us to perceive women's inferior role in African society. Gender politics are an important reason for explaining why women generally have a higher infection rate than men. African countries are known for their patriarchal society, in the sense that traditionally and legally women are discriminated in almost every aspect of their lives, making them have a lower economical and social situation in relation to men. Issues such as poor governance, homosexuality, drugs, bad health and educational infrastructures could all be seen as possible reasons for high incidence rates in Africa.

The conclusions drawn in this paper were obtained through a thorough analysis and comparison of several academic journals and books related to this area of interest.

The evidence found in this paper suggests that African women are biologically, economically, politically and socially more vulnerable to HIV/AIDS than men. Despite the fact that there are a growing number of women infected, they are still being denied access to effective preventive and curative services by their benighted societies and traditions.¹

Several women are, however, seeking ways to change their situation through many grassroots programmes, female representatives in the government and through information, communication and educational programmes that seek to inform both men and women, helping them to change their mentalities and help women to emancipate. Only recently has the issue of gender discrimination in HIV/AIDS been discussed. This inadequate response is a reflection of the male dominated societies in which they live in. It leads to the conclusion that the only solution to the rising prevalence rate of HIV/AIDS among women, is a more economical, social and political equality between genders in African States.

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Presenças Ausentes: Belmonte, o esquecimento partilhado como tradução e narrativa

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After the expulsion of the Jews, those who survived the Diaspora of the Diaspora were forced to adopt the outer signs and habits of the Catholic population, while in secret maintaining the Jewish faith and worship. Over the centuries, in few rural villages, the memory of the Jewish pattern remained alive, although diluted in the ritual gestures and blended with catholic practices. "They had never heard of Jews different from themselves." [1], and many thought to be the only survivors of their people.

I will reflect upon the role of memory in the crypto-Jewish community of Belmonte (Portugal, Cova da Beira), seeking to understand the ways of corporizing the memory through the ritual, based on Walter Benjamin's notion of *translation*: situated in a beyond-communication, the translation rises for a moment the original to a higher and purer atmosphere, where, even without reaching the fullness of the original form, it points to a wonderfully penetrating way, marking the fated and denied domain of reconciliation and unity of language [2]. The matter of memory brings together the preclusion of access to a place that is infinitely the origin of the case, and so, testimony, as evidence of true presence, continually reestablishes the being possibilities of an ontologizing narrative, threatened by fear: in the 20th century, the *Marranos* (as the «cristãos-novos» were known) *still* pray for the "salvation of the brothers caught up in the house of the Inquisition" [3], and hide the lamp of Shabbat inside a clay pot. In these contractions of traumatic memory, the «still» suggests a permanent suspension of a time that is a form of exile. Simultaneously, repetition and undocked recalls engage a state of oblivion that reconciles the event with the memory.

This "integration of the loss in the experience of remembering" [4] makes it possible to ground the place of the word as dwelling space, providing an ethical encounter that Benjamin finds in the story-teller when he says: "The storyteller is the figure in which the righteous man encounters himself." [5]

With these reflection hypotheses, we will explore the possibility of a thought that is positioned in the non-places of the memory in order to witness a culture of invisibility and secrecy.

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“Inclua-me fora disso”

Contrapoder e Cinema Marginal brasileiro.

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América do Sul, Brasil, décadas de 1960 e 1970. Surgimento e práxis daquilo que passou a ser nomeado como “Cinema Novo Brasileiro”. Um movimento que, longe de apresentar uma homogeneidade e coesão em seus pressupostos e produtos audiovisuais, veio a concretizar-se como um marco de ruptura e um referencial para a compreensão de toda a trajetória do cinema brasileiro, inclusive como parâmetro, contraponto ou mesmo *fantasma estético* a assombrar a produção nacional mais recente.

Se por um lado a dimensão histórica torna-se incontornável para a análise da produção cinematográfica no período, compreendendo-se aí um grande arco traçado entre um momento político particular, os pressupostos ideológicos em disputa, o diálogo com os outros “cinemas novos” internacionais, as mundividências presentes no processo “cinemanovista” e até mesmo as temáticas e enunciados predominantes; por outro, o caráter plural de suas manifestações, a heterogeneidade de propostas e tratamentos artísticos e os desdobramentos -muitas vezes conflituosos- imanentes ao “movimento”, mesmo sem ofuscar a sua fachada crítica e de enfrentamento da condição social, implicam também na obrigatoriedade de uma mirada capaz de estabelecer e discernir práticas discursivas singulares.

Assim, no Cinema Novo Brasileiro - essa espécie de acordo discordante -, podem ser aproximadas, enquanto “subcorrentes”, linhas em torno das quais o que marca a sua diferença interna não pode ser atribuído às idiosincrasias de seus realizadores mas, à postura estética posta em ação nos filmes dessas *subcorrentes*. É nesse contexto que presente trabalho irá apresentar os principais vetores da política e economia estéticas do que se convencionou chamar “Cinema Marginal”. Lembrando sempre, que dentro de uma perspectiva dialógica, a suposta “marginalidade” dessa *subcorrente* revela-se, mais que um forma de catalogação, uma marginalização redutora do potencial revolucionário desse cinema e de todos aqueles que quedaram baixo essa etiqueta.

A presente comunicação, sendo parte de uma pesquisa mais ampla acerca de representações imagéticas enquanto biopotência e contrapoder, apropria-se de exemplos da produção do “cinema marginal brasileiro” para discorrer como narrativa falsificante, agressão ao bom-gosto, grotesco e alegorização delirante, opacidade da linguagem fílmica e serializações contínuas, entre outros procedimentos, promoveram um das mais estimulantes desordens do discurso em um momento político ditatorial, em um jogo de poder disputado a 24 quadro por segundo.

Wittgenstein and anthropology: an analysis of Wittgenstein's *Remarks on Frazer's Golden Bough*/ Wittgenstein e a antropologia: uma análise às *Observações ao Ramo de Ouro de Frazer*

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Influenced by the challenge of Darwinian evolutionism, that contributed with a global theory concerning evolution of beings; evolutionism applied on anthropological theory had the goal to describe the historical relationships among the most diverse societies and seek the evolutionary laws of mankind. It was a way to include to mankind all humans (the question of who was really a human was a great problem for 16th century Europeans when they came to the New World and had to deal with the “savages”). But, on the other hand, it excluded them. Because the most developed society was the “Western Civilization”. And all mankind would one day pass thru the evolutionaries scales, created by the evolutionary scientists. History was already known, we might say. The names of Lewis Henry Morgan, James Frazer and Edward Tylor deserve to be recognized as the most prestigious evolutionary anthropologists, in 19th century (Eriksen and Nielsen, 2007) [1]. Among the anthropologists, the name of Franz Boas is known as a great critic of evolutionary theory. He tried to show that there was no real proof of evolution of mankind and that the relations established by the evolutionary anthropologists had no empirical research to support them. He also created new methodological approaches to anthropology (Boas, 2007) [2]. However, an analyses of Wittgenstein's *Remarks On Frazer's Golden Bough* [3], written between 1933 and 1948 can take us to Wittgenstein's reinterpretation of classical anthropological subjects, such as: the magical though, the diversity of customs, the rituals, the epistemology of anthropology and the possibilities of anthropological research that Wittgenstein sees. The central goal of this work is to put Frazer and Wittgenstein face to face. The most important achievement we had was to analyze Wittgenstein's philosophical development [4]. And we could also compare his theories to sociologists' and anthropologists' classical theories on the same subjects [5] [6].

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Parallel Oral Sessions II

A3 Numerical Methods and Mathematical Models: Applications

Central Pattern Generators in Biped Locomotion: A Numerical Approach

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Animal locomotion is an interesting research issue developed by scientists of many areas of science, from medicine to robotics. Every animal has its own form of locomotion, however, there are symmetries in the locomotor patterns that are common in different species.

Biologists assume that vertebrates' locomotion is controlled by a Central Pattern Generator (CPG), located somewhere in the nervous system. Mathematically, the CPG is modeled by a system of ordinary differential equations, where each equation represents one cell (or group of cells) and it is assumed that all cells are identical. This CPG model is capable of producing the locomotor rhythms of animals, such as walking, jumping, running, galloping, among others.

Golubitsky, Stewart, Buono and Collins [1, 2] propose a CPG model for locomotion patterns of animals with $2n$ legs. This model is based on the assumption that each leg receives signals from two cells. This is an analogy with what happens in animals' joints, where two muscles groups, flexors and extensors, control most movements.

We numerically simulate the 4-cell CPG model for bipeds (see Figure 1), studied by Pinto and Golubitsky in [3]. We consider as the internal cell's dynamics the Morris-Lecar equations. We consider two types of coupling between the cells: diffusive and synaptic. We numerically simulate the periodic solutions corresponding to the primary and the secondary bipeds' gaits. We find that the secondary gait *skip* is obtained numerically by bifurcation of the primary gaits *walk* and *run*, and the secondary gait *gallop* is obtained by bifurcation of the primary gaits *walk* and *two-legged jump*.

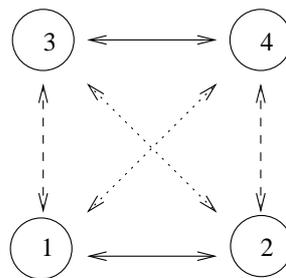


Figure 1: 4-cell CPG model for the rhythms of bipedal locomotion [3].

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Contributions to the initialization of online identification algorithms in anaesthesia

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Recent trends in medicine claim for the automation of the drug administration in clinical scenarios. Regarding almost every measured physiological variable, since the underneath mechanisms are complex, the parameters associated to the modeling of those systems are uncertain and must be somehow identified. Hence, for the development of new controllers and new drug delivery system, accurate modeling and identification algorithms must be established. For the special case of general anaesthesia, the NeuroMuscular Blockade (NMB) is one of the measured signals and reflects the effect of the muscle relaxants administration in the human body. One of those drugs is the *atracurium*. For the purpose of describing the effect of *atracurium* regarding the NMB level, several overparameterized Pharmacokinetic/Pharmacodynamic (PK/PD) models were proposed in the past [1]. Nevertheless, these structures do not enable one unique estimation of the underlying parameters with the standard system identification strategies. In [2] a new minimally parameterized Wiener model with only two parameters (α and γ) is proposed. The new modeling enabled the online identification of the model parameters, showing good results for the NMB case study.

Most importantly, in what concerns identification algorithms, one relevant issue that should be handled carefully is parameter convergence analysis. In clinical practice, most of the sufficient conditions established for the convergence results are not fulfilled. When the algorithms are not guaranteed to converge (e.g. due to practical conditions), initialization becomes more important. In case of insufficient prior information initial values must be obtained from measurements on the system [3]. This paper exploits precisely the idea of using information from the initial measured signal in order to calculate a first parameters approach for identification purposes.

NMB signals from a simulated database and from real collected patients were used to find a relationship between the model parameter α (from the linear block) and initial NMB features response, after the administration of *atracurium* bolus. The elapsed time between the bolus administration and the time where the signal drops to 50% of its initial value (T_{50}) was used. The correlation between the squared root of α and T_{50} for the simulated cases is shown in Fig. 1, having one adjusted R squared equal to 0.9843. For the real collected cases the R squared is equal to 0.7441 (Fig. 2).

These results indicate that the proposed methodology provides good initialization of the parameter α and encourages its incorporation on online identification algorithms in order to enhance the initial performance of the algorithm.

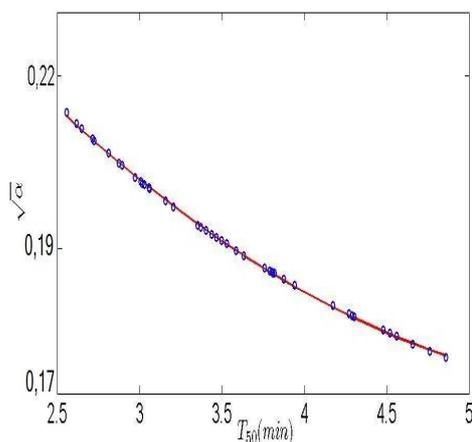


Fig.1

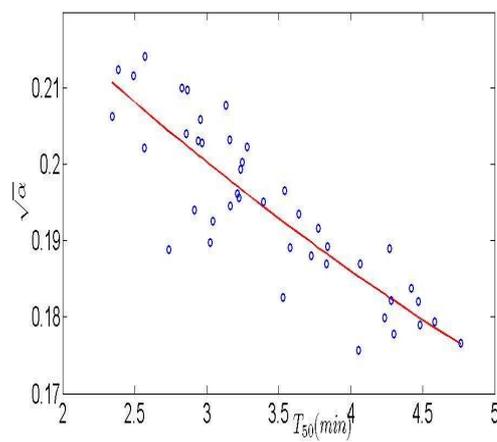


Fig.2

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Time-Frequency analysis in Heart Rate Variability Monitoring

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Information on time and frequency domain current indexes of Heart Rate Variability (HRV) can be a useful non-invasive tool, allowing access to the clinical evolution of patients, namely those being monitored at intensive care units [1]. Analyzing how spectral components evolve over time requires an approach gathering joint frequency and time information in order to access non-stationary events.

To overcome the limitations of traditional power spectral analysis in HRV, different time-variant methods have been applied, such as adaptive parametric modeling, wavelets and quadratic Time-Frequency (TF) approaches [2]. Here we take on this last approach, representing the local energy of a signal on the TF plane using a filtered version of the Wigner-Ville Distribution known as the Smoothed Pseudo-Wigner-Ville (SPWV), an element of Cohen's class [3]. It allows an independent control of the smoothing, both in time and frequency, reducing interference terms resulting from the quadratic nature of the WVD, and leading to a good joint time-frequency resolution, working effectively the compromise due to Heisenberg-Gabor uncertainty principle.

We applied this approach on HRV recordings, collected from children with acute brain injury at Pediatric Intensive Care Unit of Hospital de S. João [1]. Due to the nature of HRV data in intensive care, artifacts and non-stationarities are very common, therefore impulse rejection filtering [4] and advanced detrending [5] had to be applied preceding the time-frequency processing.

Using data treatment and SPWV it is possible to track spectral changes well localized in time and follow up their evolution. These methods are easily integrated in multimodal monitoring, what may help providing new tools to a better understanding of patients' condition and help in time-course prediction.

Acknowledgments: Work supported by FCT/CMUP and BII/UNI/0144/MAT/2008.

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Numeric Methods for the resolution of non-linear equations

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Consider an equation $f(x) = 0$ Eq. (1) where you want to find an X root. Sometimes there are no algebraic forms to solve these equations.

Then there will be exposed some new methods to find the approximation of the value X. This is a problem on which very mathematics has thought about on today's.

These methods define a succession on which each term is an approximation of the root and, with one on some conditions convert into the equation root. Furthermore, each term of this succession will be a better zero approximation of the function. Then we have the iterative methods.

Newton's method and some variants are examples of these methods. It's very interesting this search for each time more effective methods.

After comparing the computer efficiency about the studied methods, we will see which one have the better results.

Numerical solution of short-term macroeconomic models

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Macroeconomics examines the economy as a whole, proceeding from the aggregation of similar activities conducted by different agents; in particular, households, firms and government. It is traditionally interested in the path of the aggregate output (usually measured by GDP), as well as in employment and prices. Short-term macroeconomic analysis is focused on the conjuncture, and its central aim is to smooth the path of the three relevant variables. As a strong cyclical stability does not guarantee a fast and sustainable economic growth, long-term macroeconomic analysis is concerned with the economic growth. In this work, we consider mathematical models to model the short-term macroeconomic performance; i.e., Keynesian and IS/LM (linear models), AD/AS (nonlinear model) and SP/DG (dynamical model). These models require the consideration of functional forms, and thus the consideration of endogenous and exogenous variables and parameters. In order to solve these models, to extend them and to be able to tackle more complex ones, where an analytical solution does not explicitly exist or is difficult to obtain, a numerical approach is mandatory. For this purpose, it is necessary to implement computationally the model, and calibrate the parameters and the exogenous variables taking into account both empirical and theoretical literature.

The mathematics required for models construction and resolution, the exposition to some of the most widely used numerical methods to solve such problems and the economic understanding and forecast make this interdisciplinary work of great importance. The sensitivity analysis due to perturbation of exogenous variables can be rapidly accessed and graphically represented, favoring the policy maker to influence the economic development. The Philips (Sp) curve represented in the picture shows the relationship between inflation (π) and the output ratio (\bar{Y}) given a fixed expected rate of inflation (π^e). Initially the economy is in equilibrium with $\pi=6$ and $\bar{Y}=0$, the occurrence of a positive shock in the growth of the nominal GDP induces the economy in long run adjustment.

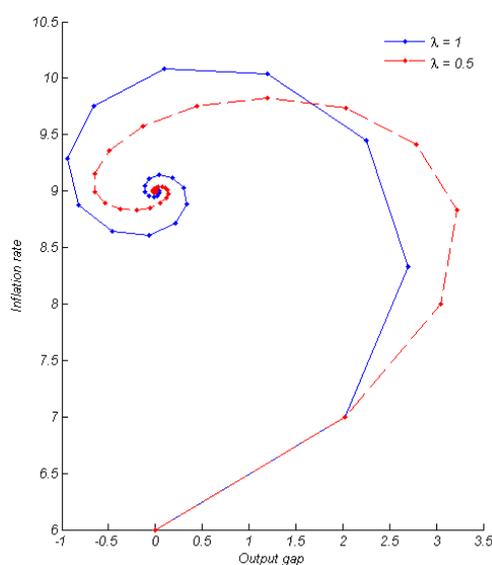
The speed and the concrete path of the adjustment depend on the inflation expectations:

$\pi_t^e = \pi_{t-1}^e + \lambda (\pi_t - \pi_{t-1}^e)$, $0 \leq \lambda \leq 1$; the bigger λ is, the greater is the speed adjustment to the new long term equilibrium.

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Cosmology with the CODEX

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This project is integrated in the BII – program from the MTES and FCT, and for me it is just beginning. In this phase we are trying to find a relationship with high redshifts and some variation in the fine structure constant.

The fine structural constant is a fundamental physics constant that depends on the electron charge - e , Planck constant - h , speed of light in vacuum – c and permittivity of free space – ϵ_0 .

The CODEX is a spectrograph for the European Extreme Large Telescope and, like all scientists, Portuguese scientists want to work with it too. In this way, we are trying to improve our results and demonstrate that we can also work with the most important instruments in Astronomy and Cosmology.

We are trying to apply a statistical method to a data, with two variables, the redshifts and other related with the fine structural constant. This method might indicate a better direction to study a possible variation of the constant, the method named Principal Components Analysis (PCA) involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components.

The main problem is how to find a matrix to apply the PCA. We tried to apply the method directly in the initial data, but it did not work very well and the results were very different from what we were expecting.



IJUP^{'10}
U.PORTO

Parallel Oral Sessions III

A1 Biological & Health Sciences: Cell and Molecular Biology

The homeodomain transcription factor Prrxl1 is phosphorylated *in vivo*

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Transcription factors (TFs) are implicated in the connectivity between the dorsal root ganglia (DRG) and the dorsal horn of the spinal cord (dSC) during development of the nervous system. The homeodomain TF Prrxl1 is specifically expressed in nociceptive neurons of the peripheral sensory ganglia and their central targets [1]. Prrxl1 gene encodes Prrxl1a and Prrxl1b homeoproteins [2]. *Prrxl1*^{-/-} mice show neuronal loss in both DRG and dSC, altered nociception and failure to thrive. Thus, Prrxl1 may be important in the establishment/maintenance of the nociceptive system [3]. When mouse embryonic SC extracts are analysed by western-blotting, Prrxl1 presents a four-band pattern differentially expressed along development [4]. Since several homeodomain TFs have been described to be phosphorylated, we hypothesised that the Prrxl1 band pattern could result from multiple phosphorylations.

Calf intestinal alkaline phosphatase (CIAP) dephosphorylation assays were performed using nuclear extracts from both E18.5 mouse SC and ND7/23 cells, a cell line with nociceptive properties [5] endogenously expressing Prrxl1. This cell line was also transfected with a pcDNA3 vector containing either Prrxl1 isoforms. Incubation of these extracts with CIAP abrogates the upper molecular weight (MW) bands, resuming to the lowest MW band. Prrxl1a was also expressed in the HeLa cell line, displaying a four-band pattern, and in *E. coli.*, where a single band pattern was observed.

In conclusion, Prrxl1 is phosphorylated *in vitro* and *in vivo*. Phosphorylation seems to be the only type of post-translational modification occurring in Prrxl1 and does not appear to be neuronal-specific. Moreover, ND7/23 cell line is an appropriate system for studying Prrxl1 phosphorylation. Phosphorylation may modulate Prrxl1 *in vivo* function in the assembly of the nociceptive system.

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Endocannabinoids in the fetoplacental unit: Effects of OEA and PEA in decidual apoptosis

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The uterus is constituted by different cell types, and in response to the implanting blastocyst stromal cells of the endometrium undergo a synchronized process of proliferation and differentiation forming a new tissue, the decidua upon which placenta develops. Crucial events for a successful pregnancy include regulated apoptosis in the decidual and placental tissues and the failure of these procedures has been implicated in complications like spontaneous abortion, and intra-uterine growth retardation. In rat pregnancy, we have previously demonstrated the presence of extensive apoptosis occurring during decidual remodelling [1] Therefore decidualization is essential for a successful pregnancy and is a tightly regulated process influenced by the local microenvironment. There is increasing evidence that the endogenous lipid mediators endocannabinoids (EC) act as regulators of key cell-signalling pathways in female reproduction [2]. Anandamide (AEA) and other EC, together with their related enzymes for the synthesis and degradation and the target receptors (CB1 and CB2), form the endocannabinoid system. Additional endocannabinoid-like compounds, such as *N*-oleoylethanolamine, OEA and *N*-palmitoylethanolamine (PEA) have been discovered, which possess biological activity by activating CBRs, or through an “entourage effect”: they may potentiate the activity of AEA by inhibiting its degradation. The orphan G protein-coupled receptor GPR55 is thought to be an additional cannabinoid receptor, which recognizes OEA and also PEA and believed to mediate many of their biological effects. Previous studies in our laboratory suggest that AEA may play an important role in regulating apoptosis through CB1 and thereby modulate decidual stability and regression during pregnancy [3]. In order to study the role of *N*-acylethanolamines and its receptor GPR55, in the regression of decidua, the effects of PEA and OEA upon cell viability (evaluated by MTT and LDH release) in primary rat decidual cell cultures was investigated. Furthermore, we analyzed by immunohistochemistry the spatial-temporal pattern of expression of GPR55 along gestation (day 8 to day 19). Our results suggest that PEA and OEA seem to play a “protective” role on apoptosis in the presence of AEA. The mechanisms underlying this possible role are yet unknown. The immunohistochemistry study, allowed us to have a spatial-temporal pattern view of expression of GPR55 that is present in the decidual tissue with an intense signal on days 10 to 14 decreasing then throughout pregnancy. Our results suggest that both OEA and PEA in uterine environment by acting on GPR55, might have an important role in regulating decidual stability and regression during pregnancy.

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Two new aromatase inhibitors: Biological evaluation and effects in an estrogen-dependent breast cancer cell line

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Estrogens are required for normal growth and development of various tissues; however, they are also responsible for promoting tumors, like breast tumors. As the enzyme aromatase catalyzes the last step in estrogens biosynthesis, the discovery of aromatase inhibitors (AIs) have shown to be an effective alternative to the classical tamoxifen for the treatment of postmenopausal patients with estrogen receptor-positive breast cancer [1].

In a previous work, we have designed and prepared new steroids with several chemical features that proved to be potent AIs in different breast cancer cell lines, reducing cell proliferation and inducing cell death [2,3]. In this work we present the results for the biological evaluation of two new steroidal AIs, **18** and **20**, resulting from modifications in the A-ring of the natural substrate of aromatase, androstenedione. Inhibition of aromatase activity was evaluated in human placental microsomes by a radiometric assay. Both compounds revealed to be effective inhibitors of aromatase in a dose dependent manner being compound **20** the most potent AI. This aromatase inhibition was also demonstrated in MCF-7aro cells, an estrogen-dependent human breast cancer cell line stably transfected with the aromatase gene. MCF7-aro cells were also used to study the effect of these compounds on proliferation and cell viability, using thymidine incorporation assays and 7AAD-staining flow cytometry, respectively. Nuclear and cell morphology was studied by Hoechst and Giemsa staining. The results showed that the new AIs inhibit proliferation of MCF-7aro cells in a time and dose-dependent manner. Cell viability decrease was accompanied by morphologic alterations such as membrane blebbing and chromatin condensation. Although compound **20** revealed to be the strongest inhibitor of aromatase activity, compound **18** was more effective in inducing cell death. These *in vitro* studies showed that the two steroidal AIs are potent inhibitors of aromatase activity and of MCF-7aro cell proliferation. These results are important for the elucidation of the cellular effects of steroidal AIs in breast cancer.

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Antimicrobial Peptides: An extensive study on CA (1-7)M(2-9) and lactoferrin derivates

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Antimicrobial peptides (AMP) are a class of peptides that have emerged as an alternative to overcome the worldwide antibiotic resistance burden. In order to improve their bactericidal activity, a number of structural modifications leading to enhanced AMP biological lifetimes and therapeutic index have been proposed. The effect of Lys trimethylation was examined using the cecropin A-melittin hybrid CA(1-7)M(2-9) platform, KWKLFFKKIGAVLKVL-amide [1, 2]. Earlier studies have shown a small loss of antimicrobial potency accompanied by a pronounced reduction in cytotoxicity in erythrocytes. From these studies, three of the singly Lys-trimethylated peptides previously tested were chosen to be evaluated with model membranes.

The partition constant (K_p) of the peptides to model membranes of varying composition was determined by Fluorescence Spectroscopy. LUVs of DMPC and DMPC:DMPG (3:1) were initially chosen and compared with previous studies on the parent peptide, CA(1-7)M(2-9). POPE:POPG (3:1), another mimetic system for the bacterial membrane, was also used to compare the activity dependence on the specific lipid composition of the membrane. To assess the role of sphingomyelin on the partition of CA(1-7)M(2-9) to zwitterionic membranes DMPC:SM (1:1) LUVs were also studied. The influence of the trimethylated analogues on the gel-to-liquid crystalline phase transition of all these systems was also followed by DSC. The results obtained clearly show that the trimethylated peptides interact strongly with the negatively charged membranes (model for bacterial cells) but not with the zwitterionic ones (erythrocyte model membrane).

The biophysical study of some lactoferrin derivatives with proven antibacterial activity, namely Lfampin 265-284, lFcin 17-30 and a chimera peptide has previously been undertaken [3]. The antibacterial activity of lactoferrin has been associated with its ability to bind to porins (pore-forming membrane proteins), thus modifying the stability and/or the permeability of the bacterial outer membrane [4]. We performed microbiological assays with some of these peptides in an attempt to correlate the interaction of antimicrobial peptides with outer membrane proteins, in particular OmpC and OmpF porins, with their antibacterial activity.

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Crossing between PCR and HACCP: a promising new approach?

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In vitro amplification of nucleic acids using PCR has become a powerful diagnostic tool. However, the lack of officially approved standardized regulations and instructions has been pointed as one of the disadvantages, as well as the difficulty to control all the variables, which can compromise the quality of the results. So, it is necessary to introduce a quality control plan and management system, in order to achieve the new universal trend of quality assurance [1,2]. HACCP is a preventive approach based on a scientific and logical system designed to identify and evaluate specific hazards at all stages of the process. Despite the use of HACCP has not yet expanded to the genetic laboratory, its foundation can be adapted and implemented in different sectors, with high probability of success. [3,4]

The aim of this work is to present a proposal for assessing internal quality of the technique of PCR-RFLP and Real-Time PCR, used daily in the laboratory of Molecular Oncology of IPO-Porto. Through a careful observation of the laboratory and its collaborators, and using the fundamentals of quality management system HACCP, the flowcharts were developed for the techniques, as well as tables for the identification of hazards, critical control points, control and corrective measures, bringing together all the actions to be undertaken during the technique and problem-solving. Some criteria were also adjusted for evaluating the various sectors of the laboratory, and used for daily observation. These may be implemented as future measures of internal evaluation of the site, its organization and collaborators.

Using the fundamentals of HACCP, the criteria and observation, it was concluded that the main requirements of work are generally satisfied, but needed a protocol to evaluate the internal quality of the various steps, in addition to the results. A plan of internal quality control was prepared, to experiment, improve and implement in the near future making possible the crossing between PCR and HACCP.

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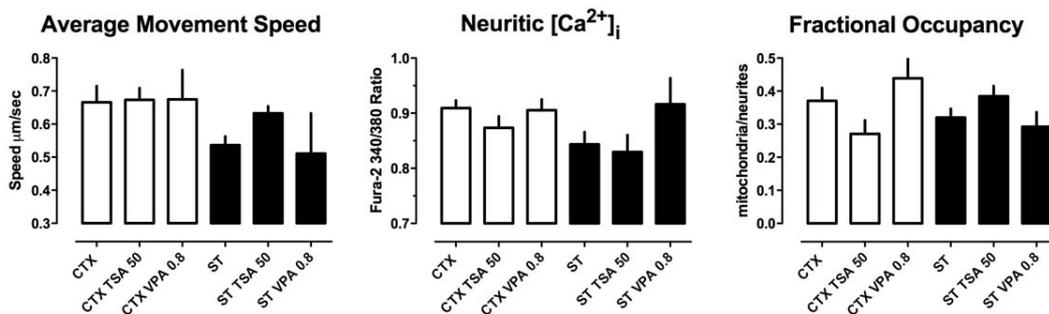
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Histone Deacetylase Inhibitors Modulate Neuronal Mitochondrial Dynamics

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Neurons are metabolically active cells with high ATP and Ca^{2+} -handling demands at distant locations from the cell body (e.g. synaptic sites). Fulfilling these distant demands requires efficient mitochondria transport, whose impairment leads to neurodegeneration. We have previously proposed that inherent differences in mitochondrial transport may contribute for the selective vulnerability of striatal vs. cortical neurons to acute and chronic injury (e.g. Huntington's disease) (#1-3). Here we compare *in situ* mitochondrial dynamics in striatal vs. cortical neurons and their pharmacological modulation by histone deacetylase inhibitors (HDACi) to further explore their neuroprotective mechanisms (#1). Sister cultures of rat cortical (CTX) and striatal (ST) neurons were imaged under control conditions and following treatment with the HDACi trichostatin A (TSA; 50nM) and valproate (VPA; 0.8mM). Neuronal mitochondria were tracked individually to determine their average movement speed (AMS) during directional trafficking. Neuronal processes were imaged for intracellular calcium concentrations (Neuritic $[\text{Ca}^{2+}]_i$), and mitochondrial fractional occupancy. Data in the Figure below are mean \pm SEM from 5 independent neuronal cultures (Exception: VPA preliminary data $n = 2$).



Untreated cortical neurons exhibit a higher mitochondrial AMS than striatal neurons ($p < 0.05$), in correlation with higher neuritic $[\text{Ca}^{2+}]_i$ ($p < 0.05$). However, a causal relationship is uncertain given that TSA significantly enhanced mitochondrial AMS in striatal neurons without increasing neuritic $[\text{Ca}^{2+}]_i$. Additional experiments will be required to verify whether VPA, with a different HDACi profile than TSA, significantly modifies mitochondrial dynamics and $[\text{Ca}^{2+}]_i$ in striatal neurons. Untreated cortical and striatal neurons did not significantly differ in fractional occupancy. This parameter seems to undergo opposite modulation by TSA in the two neuronal populations. In summary, faster mitochondria trafficking in cortical neurons may confer increased resistance to injury due to faster arrival of mitochondria to distant sites in need of ATP or Ca^{2+} buffering. Trafficking acceleration by TSA in striatal neurons is a likely mechanistic explanation for the previously reported improved mitochondrial-dependent Ca^{2+} handling (#1).

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Surface modification of chitosan porous scaffolds with recombinant fragments of fibronectin to promote endothelial cell adhesion

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Neural stem cell (NCS) therapies are among the most promising strategies for the treatment of spinal cord injuries. The transplantation of NCSs within a pre-endothelialised porous scaffold is expected to promote NCS survival as well as neuronal differentiation. Previous work showed that porous chitosan (Ch) scaffolds colonization by endothelial cells (ECs) could be achieved by physisorbing fibronectin (FN) to Ch [1]. In this study, rhFNIII₇₋₁₀, a recombinant fragment of FN including the central cell-binding domain, was investigated regarding its ability to promote EC adhesion to Ch scaffolds.

For this purpose, rhFNIII₇₋₁₀ was produced and purified. Ch tubular porous scaffolds with two degrees of acetylation (DAs), namely 4 and 15%, were prepared by thermally induced phase separation (TIPS). Scaffolds were incubated in FN or rhFNIII₇₋₁₀ solutions, and the amount of adsorbed protein, as well as the exposure of cell-binding domains quantified using ¹²⁵I radiolabelling and immunofluorescence staining, respectively. The ability of Ch scaffolds physisorbed with rhFNIII₇₋₁₀ to promote EC adhesion was investigated using a human cell line of microvasculature ECs (HPMEC ST1.6R). Cell adhesion was assessed at 24h of cell culture using a resazurin-based assay, while cell cytoskeleton organization was analysed by confocal laser scanning microscopy (CLSM) after F-actin/DNA staining.

For the range of concentrations tested, the radioiodination assay showed an increase of adsorbed protein as a function of rhFNIII₇₋₁₀ concentration. Upon physisorption, immunofluorescence studies revealed for FN and rhFNIII₇₋₁₀ similar exposure of cell-binding domains. Physisorption of rhFNIII₇₋₁₀ to Ch scaffolds with DA 4% promoted EC adhesion to Ch and cytoskeleton organization, no statistical significant differences being found in terms of cell numbers as compared to FN, except for the highest concentration tested (80 µg/mL). In contrast, rhFNIII₇₋₁₀ was unable to promote EC adhesion to DA 15%, except for the highest concentration evaluated.

Present results suggest that physisorbed rhFNIII₇₋₁₀ can be used as a strategy to promote EC adhesion to Ch scaffolds, its effectiveness being dependent on the DA. Presently, the covalent grafting rhFNIII₇₋₁₀ to Ch scaffolds is being explored.

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IJUP^{'10}
U. PORTO

Parallel Oral Sessions III

A2 History & Cultural Studies

New Digital Methods on Rock Art Recording

Fusion of 3D Scanning with Multi-Spectral Images

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Nowadays, there's a general knowledge of the problems concerning the study of Rock Art, often consisting in the difficulty to see the paintings and engravings, as well as in the limitations presented by the traditional recording method.

The usual method, which is based on paintings manual tracing and acrylic film printing is dependent on the threshold and spectral acuity of the human sight and on the operator's subjectivity. In addition, it provides a poor adaptation to the tri-dimensional morphology of the graphisms' support, reducing its record to a flat two-dimensional projection that distorts both the artworks' internal spatial relationship and its relationship and distribution through the support. At last, the frailty and size of the record which results from the application of this method, creates a difficulty both on its handling by the investigator and on the storage and conservation, factors that strongly influence its access.

Here, a new method is proposed, involving the use of non- intrusive digital technologies. These are the result of the combining of multi-spectral photographic techniques which use a combination of the light's visible spectrum with the Near Infrared (NIR) and the Ultra-Violet (UV), articulated with three-dimensional scanning of structured light (VTLE). The application of these non-intrusive digital techniques at Rock Art record eliminates the physical contact of the recording media with the graphics and, at the same time, fill some of the human sight spectral and visual acuity limitations. Moreover, it eliminates the operator's perception subjectivity. In addition, it will also provide a tri-dimensional photo-textured digital model which can be easily handled by the investigators, giving them accurate access to the artwork's spatial relationship, and to its relationship with the morphology as well as to its distribution through the support.

Technical and morphological study of Iron Age glass beads from Crasto de Palheiros - Murça (Vila Real): First results

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This presentation set up the first communication of results of a project that was carried out within an Integration into Research Grant (FCT-BII) being the grantee a member of CEAUCP/CAM. The project consisted in the morphology and chemistry study of an archaeological collection of 54 glass beads dated from the 1st Iron Age found in the archaeological site of Crasto de Palheiros – Murça (Vila Real).

Although not exceptionally vast, this archaeological collection, comprehend a significant diversity of shapes and surface textures. In previous and ongoing work the condition of occurrence, nature, diversity, and conservation of those beads posed several scientific questions that stimulated a monographic study of the collection in an innovative archaeometry point of view, whose first results are reported here.

The morphology and micromorphology of the surface sections of the glass beads was recorded preserving integrity of all specimens aiming the determination of manufacturing techniques and subsequent alterations. Several analytical techniques were tested in terms of their ability to evaluate the detailed chemical composition of both the glass matrix and the metallic fraction, i.e. the gold foil included in some beads. Elementary composition is a token to the production technology, either for glass as for metals, and eventually a clue for the detection of raw materials, manufacturing centres, and causes of recorded alterations that might arose later in response of environmental factors (burial, humidity, fire, chemical aggression).

Observations were done with optical media in natural light (binocular loupe), and performed measurement of dimension and weight seeking typological classification, morphology characterization, and definition of suitable areas for detailed physicochemical analysis in association with micromorphology picturing in scanning electron microscopy (SEM). A selection of 10 beads representing main types was tested in Raman spectroscopy. A failure in an electron microprobe prevented so far the analysis of metals contained in the gold foil included in several composite beads.

In a word, this project consisted in the trial of available non-destructive analytical techniques that might well adapt to the object of study. Archaeology studies approach more and more the exact and experimental sciences, promoting a greater and useful interdisciplinarity. The study of the nature of archaeological materials done this way therefore allows comparison with other similar realities around the world and, in this case, the proposal of consistent origin of materials, manufacturing techniques, exchange routes, and also the identification of natural and artificial processes that affected them along time with repercussions in our days in conservation, restoration, and valuation of cultural heritage.

Methodologies for a Contextual Inventory of Religious Ovarense Heritage

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Presently, taking an inventory of cultural goods has attracted the attention of numerous national and international institutions. The Vatican took a written position on the topic on December 1999 which was published by the Pontifical Commission for the Cultural Heritage of the Church. This Magna Carta entitled *Necessity and Urgency of Inventory and Cataloguing of the Cultural Heritage of the Church* made the Church's concern in safeguarding and knowing its artistic legacy in the religious sphere evident. Portugal followed suit.

Within the national context, the method for taking inventory in various projects of religious heritage is based on a formal analysis which has directed our knowledge on the subject towards suppositions and failed results. The execution of a cultural object and its artistic quality depend on the role of artist commissioned. A work of art could have a formal context which is reminiscing of an artistic trend of the past in accordance with the models and structures of the day yet be created fifty years later. Situations such as those above lead us to reflect and defend a new approach to the method of taking inventory: an analysis based on documents which is scientifically more rigorous and that will help better know the object and all its artistic constraints.

Starting the inventory project of religious artistic heritage in the county of Ovar, a careful analysis of various inventory projects was carried out and the county's own method was created with inventory forms of diverse Church assets in Ovar. For the first time, the inventory form had justifiable and pertinent fields of analysis that would safeguard and know each item of heritage. The form also included guidelines used for filling it out which required the reading and analysis of the Diocese and Parish documentary assets (revenue and expenditure records for brotherhoods, fraternities, Reeve Committees; Visitor's books; Inventories, notarised documents; etc).

Bringing together archive with field work results in dating works of art, naming artists and their school, as well as the knowledge of the change of architectural space throughout the centuries and the existence of objects that have not survived time or/and the changes to sacral spaces. This entire universe of information, existing or missing, (Crypto-History) is of great importance for the understanding of existing heritage material, knowing the main active workshops in and out of the county that have produced art for this region in addition to knowing the role of the patrons and commissioners of the art in order to define the artistic quality of the Religious Heritage in Ovar

In conclusion, taking inventory using written and graphical documentation has rigorous knowledge as the primary objective. This knowledge is contextualised in its period with its characters and respective regional constraints (whether social, cultural, political or economical) this way taking inventory is valuable work which allows for a qualitative leap in future projects.

The catholic religious architecture of Macau: the state of affairs. A research project in History of Art.

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The meeting of civilizations occurred in Macau constitutes one of the peeks in the “proto-globalising” process of the Portuguese Discoveries. From the adaptations in both Eastern and Western Cultures a third cultural entity is born, imbued with its own set of characteristics mirrored by the territory’s development. The main objective of this project is to know the singularities of the catholic religious architecture of Macau, the West’s gateway into China and the headquarters of the Religious Missions in the East.

The project is a work in progress to be extended throughout our academic *curriculum*. A first stage was already developed by means of an “Integration in the Investigation Scholarship” granted to us by the CEPESE. A survey of the information available on this subject in the bibliography (on paper and online) was carried out at this point.

The collected data was organised in tables, with the respective sources pointed out, to allow an efficient comparison within it and with new information. We have obtained a general knowledge of the sources available on the archives throughout the world, a step that will ease their future analysis. Being a History of Art’s research project, the information from the archive must be compared with that given by other sources. Collected both on diverse bibliography and on the Internet, this other sources were categorised into: descriptions, engravings, drawings, paintings, photographs and maps. The analysis of this newly collected data, allowed to question some of the information presented and reveal gaps on previous studies, as well as to elaborate some investigation hypothesis. With a project like this, one wishes to obtain an increasingly accurate and scientific knowledge about the certainties and doubts that one deals with when facing these buildings, their evolution and their peculiar richness.

The first stage, with a special focus on the period preceding the ample renewals made on the 19th century, embodies a sort of *notebook* quality indispensable to a fieldtrip or to an investigation on the archive. Despite its limitations, we have a fairly complete knowledge of the information produced on the subject, always supported by the necessary background.

Conclusions

The existing studies provide information rich both on contradictions and *lacunae*.

The classification of Macau’s Historical Centre as a World Heritage Site, in 2005, hasn’t produced information providing answers to the risen questions on previous and doesn’t take full advantage of the various graphical sources available.

Even though one has to deal with extreme difficulties when trying to reconstitute this buildings’ evolution, one cannot but notice that their artistic and patrimonial values come from their architectural qualities, the History and memories they symbolise and their hybridist and adaptation virtues. These values acquire an increased importance when one is faced with a world that daily debates its own globalisation.

Treaties and detached decorative prints: the formation of an artist in the 18th century

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In the early years of the third decade of the 18th century began to emerge the first signs of a new decorative style: the Rococo. At the time called *modern taste* and characterized for the use of asymmetric, exuberant and elegant shapes, the Rococo, originary mainly in Central Europe, but also from France, arrived to Portugal through the decorative prints and devotional images. The country was living a moment characterized by the internationalization of taste that was established in John V court, by foreign artists circulation and by the growth of orders in the different European creation centers. These facts led to an increasing interest for the information conveyed by the book and prints, allowing set the 18th century as a period of great enrichment of Portuguese engraving collections. This pictures and underlying artistic information marked indelibly the Portuguese artistic panorama until the end of the 18th century, forming a set of assimilated elements mainly by monastics nuclei of Entre Douro and Minho. Were mainly these spaces of movement and action of Friar José de Santo António Ferreira Vilaça (1731-1809), remarkable figure of the second half of the 18th century.

Lay brother of the Benedictine Order, Friar José Vilaça took his artistic dimension in the art of carving, both as carver as author of sketches. Few things are known about his training, just he was started on carpenter's work by his father. However, 1757 has revealed as a remarkable year in training path of future artist: to keep up his father as assistant in the carving execution of the new chancel in the church of the Monastery of Saint Martin in Tibães, the young José Vilaça was one of the main disciples of André Soares (1720-1769), the artist responsible for the introduction of the Rococo in the city of Braga. Is very likely that the young José Vilaça has contacted directly with the sketches executed by André Soares, as well as with the decorative prints which have began to integrate the monastery spoils. Years later, with his artistic career launched, Friar Vilaça began purchasing some technical books, architecture and decoration treaties, which became part of their personal library. Through the careful analysis of these books and some detached decorative prints existing in the Municipal Public Library of Porto- prints from plundered monasteries during the dissolution of religious orders, enacted in 1834- and proceeding a comparative analysis with the artist monk work in several Benedictine Order monasteries, we can conclude that the new artistic language was been assimilated by Friar Vilaça, acting as visual support for is sketches. We also concludes, despite the adoption of this decorative repertoire, the Benedictine artist reinterpreted these motifs giving them a personal touch, fact which covered his work of an original character, showing the greatness of his creative genius.

History of Art's role in a world heritage city. A case study: Oporto.

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To the most recent notions of heritage we found directly linked the concepts of authenticity, imperative to a classification, and multidisciplinary, essential to its valorisation. A city's artistic heritage, its conservation and valorisation are some of the driving forces to obtain the title of World Heritage Site. With this project, we aim to evaluate the role of History of Art (HA) in all this process, using the specific case study of the city of Oporto, World Heritage Site since 1996.

To reach this goals we proceeded to analyse the existing documentation, both on paper (bibliographical and archival) and online. The analysis of the Oporto's Historical Centre (OHC), World Heritage Site, was also made through field work. This documentation divided, in official and officious, covers the World Heritage notion, the Application Process of OHC, its maintenance, and study of the artistic heritage that the city contains.

The data obtained was organized in listings and schemes. The contents of the Application Process, the subsequent publication by the official entity (CRUARB) and the bibliography used were also examined. Through the analysis of the Internet official and officious sites, we found an almost complete absence of references. For both cases, when researchable, the bibliography reveals major gaps in HA's studies, and ill cared use of the information provided by this resources. The *status quo* was not altered in recent publications. The approach of the artistic object in the few texts used, that were created within the context of HA, enhances the value of its patrimonial dimension. The focus given to the artistic object, both building and its content, is inadequate. Only in recent initiatives by the official entities can one find an emphasis on artistic heritage (so far only theoretical). Throughout our field trips we were also able to find gaps in the information resources available *in loco* and in the valorisation of the buildings. Above all, there is a lack of understanding of the city as a total work of art.

Conclusion

Judging by the state of OHC, by the official entities' actions and by the results obtained through the analysis made, we can conclude that the HA's potentialities are underused to value the artistic heritage (urbanism, architecture and artistic object) in our case study. An efficient valorisation triggers a mechanism that protects the classification obtained. This requires a profitable use of the heritage and its correct advertising by which we can sustain its maintenance. According to the principles that were in the basis of the creation of a World Heritage concept, this mechanism should stress the idea of artistic heritage as an identity generator and take into account the necessities of a multidisciplinary approach. The specificities of HA play a major role in the elaboration of a professional and qualified product to the ever so demanding historical centre's tourist.

To better express the potentialities of Oporto as a total work of art, we elaborated a small multimedia project in video format.



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Parallel Oral Sessions III

A3 Communication Sciences

A Flu and the Agenda-Setting Theory: an analysis of the six major Portuguese newspapers

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This article aims to prove the existence of Agenda-Setting in the media coverage regarding the issue of A Flu (H1N1). In complement to the Agenda-Setting, it will also demonstrate the prevailing frames in its coverage.

Based on a Quantitative and Framing Analysis of the six major Portuguese newspapers on 5 May and 24 September of 2009, this study concludes that exists, in fact, the Agenda-Setting and that the Media promoted just the frame provided by the Government.

Despite some critics, partly resulting from the delay in reporting the first infection with the H1N1 virus in Portugal, the media "accepted" and were influenced by the Governmental Framing.

The representation of minority in the press – Speech analysis of the news about the homosexual marriage in Portugal

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This article aims to demonstrate that Portuguese press is homophobic. In analysis are news published in the newspapers "Público", "Diário de Notícias", and "Correio da Manhã", related with the two law projects presented in the Assembly of the Republic in order to legalize the marriage between people of the same sex, both rejected by the Parliament in 2008. The news was submitted to a quantitative analysis based on two types of measurement: nominal and ratio level. And qualitative, based on speech analysis, which considered types of speech and sources, and the use of verbs and other grammatical features indicators of opinion. The relevance of the issue is based on the need to understand the space, the prominence, and the importance given to this minority group in relation to the majority group of the heterosexuals.

The influence of television on development of teenage personality

A Content Analysis of Morangos Com Açúcar

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“Television is the whole sale distribution of images and forms the mainstream of our popular culture” [1]

Morgan and Signorielli

Morgan and Signorielli have argued that “Our children are born into homes in which for the first time in human history, a centralized institution rather than parents, the church or the school tells most of the stories .The world of television shows and tells us about life: people, places, striving, power and fate”. [2]

In Portugal, the teenagers view “Morangos com Açúcar”, a soap opera that tries to describe their day in school and with family. The audiences show its success throughout the years. So, it’s important to discuss the contents of this TV programme, and ask some questions. Does television use among adolescents contribute to their attitudes about sexuality and their sexual behaviours? And what about the contents exposed on this TV programme? Is there any connection with reality? Or there are some biases that distort the representation of teenage routines?

The paper presents the results of a content analysis on three months of “Morangos” episodes. The characterization of the episodes content is discussed in relation to scientific literature with similar concerns.

Key words: teenagers, Identity, Sexuality, Bias

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Framing USA Elections in the Iberian Peninsula

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The article aims to analyze the framing of Obama's election in the Iberian Peninsula through a quantitative and qualitative content analysis of the hard news of two newspapers: one from Portugal (Público, Oporto's edition) and another from Spain (El País, Galiza's edition). From the press analysis since Obama's victory over Hillary Clinton to the election as the 44th President of United States of America, it concludes that the news framing was similar in both countries something which could mainly point to the globalization of the news.

A look at Machinima: Machine Animation in Virtual Worlds and Social Media

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Machine Animation in Virtual Worlds (or Machinima) has proven to be an inexpensive way for filmmakers to produce new scripts and ideas based on easy accessible tools available online. Cyberspace users are more and more creating their own personalities and characters in virtual worlds with the purpose of living experiences that their real life can not provide them. Virtual environments, such as Second Life, provide an unexplored ground for documentary filmmakers to explore this current view of cyberspace. “Womem of Second Life”, a machinima documentary that explores the day-to-day life of a Second Life prostitute, is a perfect example of the many possibilities for documentary research that virtual environments can provide.

Classic & Urban Culture in Oporto - Augmented Reality in Social networking

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University of Porto - Communication Sciences Department

The main goal of this paper is to illustrate an ongoing project related with the possible creation of cultural contents within a social network, taking advantage of the potential of the connections among the young community, and introducing new languages and new visual communication paradigms of a specific medium.

The essence of the project is to produce a perfect symbiosis between the Urban and, what we called, the Classic elements of the Oporto's culture to generate an interaction with the public using, in this case, Facebook. According to Facebook press room, there are more than 300 million active users around the world.

The final goal of the project is to emphasize the Classic Culture of the city having the Urban Life Style (or Urban Culture, such as restaurants, bars, cloth stores, art galleries and other alternative spaces) as a primary framework.

The methodology is quite simple: it has been created a Facebook group (Classic Culture & Urban Culture – Oporto) where polls are posted. During a fortnight, the poll is on for suffrage and, afterwards the group goes to the field to produce video contents, in which the elements of the Classic Culture (monuments, museums, etc.) are included using augmented reality processes. The videos of the elected places are going to be published on Facebook.

According to the 2008 ANA Traffic Yearbook, the Oporto Airport was one of the only that has not decreased its traffic, but, actually, it was the only one with an increase of 13,7%.

This brand new project is a different and effective way to communicate with younger population (also with foreign students) about the culture of the city, basing its work on a maxim "We will produce what you want to see". Although, the movie clips are not going to be too long, cause it's not our aim to offer a full virtual or a video coverage of the city, but to approach youth public to the culture classic elements of the city. The suggested visual language will try to respect the sense of time and presence in a social network like Facebook.

In this paper, as an ongoing project, a short video will be prepared, as the result of work, as well as some figures reporting the detailed processes.

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Parallel Oral Sessions IV

A1 Biological & Health Sciences: Dietary and Bioactive Compounds II

Modulation of angiogenesis and inflammation by beer-derived polyphenols- *In vivo* effects

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Despite their distinct etiopathogenesis, cardiovascular disease, cancer, diabetes and obesity are being considered angiogenesis-dependent diseases, associated with a chronic inflammation state and oxidative stress that together with hypoxia are the main stimulus of the angiogenic process originating unstable and leaky vessels.

Hop-derived supplements and beer contain several polyphenols: xanthohumol (XN), which can be converted to isoxanthohumol (IXN), and in the potent phytoestrogen 8-prenylnaringenin (8PN). Each of these influence both inflammation and angiogenesis. We have previously shown a differential effect of the referred polyphenols along the angiogenic process: endothelial (EC) and smooth muscle cells viability (MTT assay), proliferation (BrdU assay), apoptosis (TUNEL), invasion (double-chamber assay), and cord-like structures formation (Matrigel assay). Interestingly, while 8PN stimulated angiogenesis, XN and IXN manifested anti-angiogenic effects. Our study aims to confirm *in vivo* modulation of angiogenesis and inflammation by XN, IXN, and 8PN.

C57BL/6J mice were injected subcutaneously with Matrigel containing VEGF with or without polyphenols. After 7 days, the plug was removed and hemoglobin (Hb) content (Drabkin's Reagent) and N-acetylglucosaminidase (NAG) activity in the serum were measured. For skin wound-healing assay, two full skin-thickness longitudinal incisions were created on the dorsal skin of Wistar rats. Polyphenols were administered topically during 7 days. Wounded tissue was collected for histology and NAG activity and IL1 β in the serum was measured. Statistical difference between various groups was evaluated by Mann Whitney U-Test, and Bonferroni test. Differences were considered significant whenever $p < 0.05$. Retinal angiogenesis in neonatal mice, a valuable model for investigating endothelial sprouting and organization of vascular networks was established. C57BL/6 mice pups were injected intraperitoneally with tested compounds, daily, until day 7. Then, pups were euthanised and eyes enucleated, fixed in 4% p-formaldehyde overnight, and retinas were dissected out and stained with FITC-conjugated isolectin. Finally, retinal endothelium was visualized in a fluorescent microscopy, photographed and avascular and total retina area quantified.

Regarding the results, both plug and skin wound-healing assays confirmed that treatments with XN and IXN reduced the number of vessels formed and decrease NAG activity and also IL1 β in the serum from wound-healing rats, while 8PN increased the formation of blood vessels in both assays and NAG activity and IL1 β in rat sera. Preliminary results on retinal assays also suggest an anti-angiogenic effect of IXN and XN in accordance with the previous results.

Interestingly, while 8PN seems to stimulate angiogenesis, XN and IXN manifested anti-angiogenic and anti-inflammatory effects. These findings emphasize the distinct effects obtained by compounds with identical chemical structures in angiogenesis and inflammation, providing clues to the development of useful therapeutic agents against inflammation- and angiogenesis-associated pathologies.

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Chemopreventive effect of a green tea catechin, EGCG, on human melanoma cells: cytotoxicity studies

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Melanoma is currently the most deadly form of skin cancer: once it has spread beyond its original location it is highly resistant to chemotherapy and its mortality exceeds 85% of cases [1]. Due to the low efficiency of currently available treatments for melanoma, studies focusing on development of effective chemopreventive strategies are crucial. Evidence suggests that several compounds from human diet (phytochemicals) have chemopreventive properties [2]. EGCG, the most abundant phenolic compound of green tea, has been identified as the catechin mainly responsible for lowering risk of several cancer types (including skin cancer) attributed to the regular consumption of green tea [3]. The aims of the present work were to evaluate the cytotoxic effects of EGCG on human A-375 melanoma cells and to get some insights on the mechanism(s) leading to cell death in melanoma cells.

Cell viability tests (MTT, Alamar Blue and Trypan blue exclusion assays) were used to evaluate cytotoxicity of EGCG in tumour (human A-375 melanoma) and non-tumour (human BJ fibroblasts) cells. Nuclear Hoechst 33258 labelling was used to identify apoptotic nuclei in cell populations after EGCG treatment (LD₅₀). COX-2 expression was investigated by immunocytochemistry using a polyclonal COX-2 primary antibody (1:100) and a fluorescent secondary antibody (Alexa Fluor 488; 1:1000), visualized by fluorescence microscopy. The effect of EGCG on COX-2 inhibition was evaluated using the *COX Inhibitor Screening Assay kit* (Cayman Europe).

Results obtained showed an EGCG-mediated cytotoxicity which was concentration and incubation-time dependent. This effect was not observed in BJ cells, suggesting that the EGCG-mediated cytotoxicity is tumour selective. Moreover, it was established that this cytotoxicity is mediated by induction of programmed cell death (apoptosis) as revealed by apoptotic morphological nuclear characteristics observed only in A-375 cells. The EGCG-mediated COX-2 inhibition was also established (IC₅₀ = 19.42 µM). The expression of COX-2, in human A-375 melanoma cells, was confirmed by immunocytochemistry. Based on these results and in the literature [4], we propose COX-2 as the molecular target for the EGCG-mediated chemoprevention in melanoma cells. Our findings suggest that EGCG (the most abundant green tea catechin) represents a promising chemopreventive strategy in melanoma.

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Biological activity of caffeic acid derivatives: Antioxidant and Anti-Inflammatory Effects

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Phenolic compounds, including phenolic acids, are bioactive compounds believed to be involved in protection against oxidative damage, at least in part, due to its antioxidant capacity. Xanthine oxidase is a source of free radicals (ROS) derived from oxygen and different mechanisms are known to lead to increased formation of superoxide by this enzyme. In inflammatory processes and in other pathological conditions there is an increase in the formation of ROS, with consequent increase of the damage attributed to these free radicals. In recent years, studies have been developed for new inhibitors that, contrary to allopurinol (inhibitor default), have less relevant adverse effects. Currently the interest is to develop compounds structurally different from purine/pyrimidine, such as phenolic acids. In addition to their antioxidant activity, some phenolic acids had shown to exhibit inhibitory activity for the cyclooxygenase (COXs) enzymes (which lead to prostaglandins production). The present study aimed at evaluating the ability of three derivatives of caffeic acid to inhibit xanthine oxidase and COX type 1 and 2 enzymes.

Three derivatives of caffeic acid (an hydroxycinnamic phenolic acid), synthesized in the Laboratory of Organic Chemistry, Faculty of Pharmacy, University of Porto: acid, trans-3-(3,4,5-trihydroxyphenyl)-2-propenoic (THPPE) and their esters, trans-ethyl-(3,4,5-trihydroxyphenyl)-2-propenoate (ETHPPE) and diethyl - 2 - (3,4,5-trihydroxyphenylmethylene) malonate (E₂THPPE) were tested to evaluate its inhibitory ability upon XO, COX-1 and COX-2 enzymes, using enzymatic kits of high sensitivity (XO: "Amplex® Red Xanthine/Xanthine Oxidase Assay Kit", Molecular Probes (Eugene, OR); COXs: "COX Inhibitor Screening Assay", Cayman Chemical). Results are expressed as mean \pm standard deviation (SD) of n experiments. IC₅₀ values (concentration able to inhibit 50% of enzyme activity) were also calculated. Statistical significance between different treatment groups was considered for $p \leq 0.05$ (ANOVA, "one way" analysis of variance, followed by multiple comparison Tukey's *t*-test).

THPPE, ETHPPE and E₂THPPE are able to inhibit the activity of xanthine oxidase, confirming that some of the antioxidant properties exhibited by other phenolic acids can be ascribe to this enzyme inhibition. E₂THPPE was the most promising compound under study, presenting IC₅₀ E₂THPPE = IC₅₀ allopurinol (allopurinol = E₂THPPE > ETHPPE > THPPE). These compounds were shown to be equally effective in inhibiting COX-1 and COX-2 but requiring higher concentrations than the reference compound, indomethacin (COX-1: indomethacin > E₂THPPE = THPPE > ETHPPE and COX-2: indomethacin > E₂THPPE > THPPE = ETHPPE). IC₅₀ ratios COX-2/COX-1 found for compounds E₂THPPE, ETHPPE and THPPE are of the same magnitude, 0.33, 0.59 and 0.94, respectively. However, E₂THPPE seems to be the inhibitor that can cause adverse effects less intense (IC₅₀ ratio COX-2/COX-1 = 0.33).

In conclusion, the compounds under study showed promising antioxidant (inhibition of xanthine oxidase) and anti-inflammatory (inhibitor of cyclooxygenase) activities.

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Effect of prolonged beer consumption on hepatic redox status and metabolic markers

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Oxidative stress is an important element in several pathologies, including cardiovascular diseases, cancer, neurodegenerative pathologies, as well as in aging. The content of beer (B) in both putatively pro-oxidant components (ethanol) and antioxidant polyphenols raise questions about the biological effects of its moderate consumption on human health.

Thus, it seemed appropriate to evaluate, in the Rat, the effect of beer ingestion in the organism's redox state and inflammation together with other relevant metabolic markers. To perform that, three groups of 6 male Wistar rats were treated for 8 weeks with: water (control, C); ethanol solution (5.4% ethanol, E); lager beer (5.4% ethanol, B). Redox status and inflammatory evaluation were determined in liver homogenates. Analysis of plasma biochemical markers included the evaluation of hepatic damage and metabolic status markers. Treatment with B or E as the sole fluid source did not cause oxidative alterations to hepatic proteins and lipids (measured as protein carbonyls and thiobarbituric acid-reactive substances), nor to the levels of plasmatic liver damage markers (aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase), when compared to control animals. Regarding hepatic antioxidant defenses, we observed a significant increase in oxidized glutathione (GSSG) concentration and in GSSG/GSH ratio, after E or B treatments, not accompanied by a raise in the total glutathione or in the activity of enzymes involved in glutathione (GSH) metabolism (glutathione reductase and glutathione peroxidase). The modulation of the different forms of glutathione appears to be related to *de novo* GSH synthesis, as it was evidenced by the significant increase in glutathione synthetase transcription, evaluated by RT-PCR, in B-treated rats, with the same trend in E. There was no evidence of inflammation following any of the treatments, since no increase was observed in hepatic NFκB activation (measured by ELISA) nor in TNFα transcription. Regarding the metabolic level, although the B-treated rats had an HDL/LDL ratio similar to controls, this parameter was increased when compared to group E.

In short, prolonged consumption of B had an impact on hepatic redox status, particularly stimulating *de novo* GSH synthesis, although with a large contribution of alcohol to this result. On the other hand, B consumption led to maintenance of pro-inflammatory markers and a beneficial change in lipid profile, herein with a marked contribution of other components of beer, possibly the polyphenols.

This work was supported by “Projectos Pluridisciplinares para estímulo à Iniciação à Investigação na U.Porto/Santander Totta” (IJUP), iBeSa (Instituto de Bebidas e Saúde), and FCT (Fundação para a Ciência e Tecnologia - POCI, FEDER, Programa Comunitário de Apoio, PTDC/QUI/65501/2006; SFRH/BPD/40110/2007, SFRH/BD/28160/2006, SFRH/BD/46640/2008 and SFRH/BD/64691/2009).

Prediction of intestinal absorption of bioactive xanthenes across Caco-2 cell monolayers using an HPLC-UV method

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Approximately 50% of drug failure is due to unacceptable efficacy, mainly caused by poor bioavailability. Good permeability through intestinal membranes, which leads to adequate systemic absorption, is an highly desirable property for drug candidates. A cell model system, such as Caco-2, is commonly used during drug discovery and development as a predictive tool to estimate intestinal absorption. [1] The aim of this work was to evaluate the intestinal absorption properties of four xanthenes with antitumor activity [2], namely two dihydroxyxanthenes, a xanthonolignoid and a pyranoxanthone, using Caco-2 cell monolayers as model. Transport studies were conducted in the absorptive direction [apical (AP)→basolateral (BL)] (Fig. 1). Test compounds were added to one side of the monolayer, and their concentrations were measured on both sides by HPLC-UV.

Transport of all xanthenes occurred in the absorptive direction (apparent permeability values, P_{app} , 0.012-2.8 nm/s). Nonetheless, in case of two xanthenes, a poor recovery was observed which could be due to nonspecific binding to cells/devices.

Afterwards, we performed another assay, which intended to study the influence of chitosan in the permeability of these compounds. These results will allow to comprehend the mechanism of absorption, since these absorption enhancers can act through increasing the transcellular and/or the paracellular transport of hydrophilic compounds across mucosal epithelia.

In the particular case of chitosan, it is known that its mechanism of action is related to a transient opening effect on the tight junction's of the cell membrane without interfering with the viability of the cells. [3] An enhancement of the transport occurred for the four xanthenes (P_{app} , 0.76-2.15 nm/s), leading to the assumption that chitosan interferes directly with the pathways involved in intestinal absorption of the tested compounds.

To perform in-depth mechanistic in Caco-2 cells, studies on these compounds concerning bi-directional Caco-2 cell permeability and the use of probes to represent an efflux (P-gp) transport are in progress.

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Acknowledgements: To CEQUIMED-UP (I&D 4040/2007), U.Porto/Santander Totta for support.

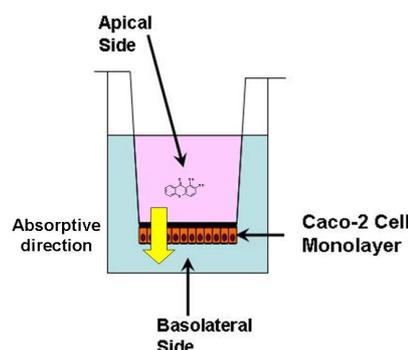


Fig. 1. Schematic representation of the assay in Caco-2 cells.

Impact of mineral micronutrients upon COMT expression and activity in rat liver and adrenal glands

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COMT is a magnesium dependent enzyme that catalyzes the methylation of catechol substrates, as estrogens and polyphenols, performing a most important role in catecholamine metabolism, mainly in adrenaline.[1] These amines play key roles in the regulation of numerous physiological processes and are being implicated in an everexpanding array of neurological, psychiatric, endocrine, and cardiovascular disorders. Magnesium, COMT cofactor, although essential for several cell reactions, has a dietary intake in much of the Western World population inferior to the recommended dietary allowances.[2] A relationship between low COMT activity and various disorders has been suggested, and much attention devoted to the impact of COMT polymorphisms on cardiovascular health.[3]

The aim of this study was to test the effect of a magnesium-deficient diet and of a high magnesium intake in COMT activity. The effect of these different diets on COMT expression was also evaluated.

Adult Wistar rats (weighting 270-300g) were treated for 7 weeks with three different diets (group 1: standard; group 2: high sodium, low magnesium; group 3: high sodium, high magnesium). At the end of the treatment, COMT expression in the liver and adrenal glands was evaluated by RT-PCR, and COMT activity determined, by HPLC, in the same tissues, by measuring metanephrine formation after exposure to adrenaline. Statistical analysis were performed by one-way analysis of variance (ANOVA) followed by Newman-Neuls test for multiple comparisons. Arithmetic means are given with S.E.M..

Liver COMT activity showed significant differences between the high magnesium intake and the control groups (n= 4-6, p< 0.05), with a maximal enzyme activity 1.3-fold higher in the high magnesium intake group (V_{max} : 26.5 ± 2 nmol/h/mg protein) compared with the control (V_{max} : 20.0 ± 1.4 nmol/h/mg protein), as well as a 1.6-fold increased affinity towards adrenaline (K_m : 56.56 ± 18.03 vs 88.63 ± 22.40 μ M). COMT mRNA expression in adrenal glands significantly decreased with high magnesium intake, being about 46% lower in this group compared with the standard diet group (n = 4-6, p< 0.05), while in the liver it remained unchanged in response to the three different diets (n = 6).

These results suggest that diet may impact COMT expression and activity.

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The effect of folate status on the uptake of physiologically relevant compounds by Caco-2 cells

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The aim of this work was to investigate the effect of folate status on the uptake of several physiologically relevant substances by Caco-2 cells. For this, Caco-2 cells cultured in high-folate conditions (HF) were compared with cells cultured in low-folate conditions (LF). Growth rates of HF and LF Caco-2 cells were similar. However, proliferation rate of LF cells was significantly greater than that of HF cells during the first two days of culture and slightly smaller thereafter, viability of LF cells was greater than that of HF cells, and apoptosis index was similar in both cell cultures.

We verified that in LF cells, comparatively to HF cells: (1) uptake of 3H-folic acid was upregulated, via a significant increase in the V_{max} of uptake; (2) uptake of 3H-deoxy-glucose, 3H-O-methyl-glucose and 3H-1-methyl-4-phenylpyridinium (MPP⁺) was downregulated, via a decrease in the V_{max} of uptake; additionally, a reduction in K_m was observed for 3H-O-methyl-glucose; (3) uptake of 3H-5-hydroxytryptamine and 14C-butyrate was not changed; (4) the steady-state mRNA levels of the folic acid transporters RFC, PCFT and FR α , of the organic cation transporter OCT1, of the glucose transporter GLUT2 and of the butyrate transporter MCT1 were significantly decreased.

In conclusion, folate deficiency produces substrate-specific changes in the uptake of bioactive compounds by Caco-2 cells (folic acid uptake is upregulated, glucose and organic cation (MPP⁺) uptake is downregulated, and butyrate and 5-hydroxytryptamine uptake are not changed). Moreover, these changes are associated with alterations in the steady-state mRNA levels of specific transporters for these compounds.

Key-words: Caco-2 cells; folate deficiency; membrane transport; bioactive compounds.

* Equally contributed to the work



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Parallel Oral Sessions IV

A2 Chemistry I

Synthesis of Silica Particles for Textile Applications

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Organosilica based materials with micro and nano dimensions have attracted much research attention due to their potentialities in Nanoscience and Nanotechnology. Several methods have been developed for the preparation of silica nanomaterials and their incorporation onto textiles, to add novel functionalities such as hydro/oleophobicity and thermal insulation [1]. However, such procedures are usually complicated and expensive due to the use of templates in the silica synthesis and processes for their removal [2].

In the present work, a simple and low-cost method for the synthesis of silica particles by sol-gel method without the use of templates is reported. The procedure involves two steps: acid hydrolysis of phenyltrimethoxysilane followed by condensation in the presence of a base [3]. The effect of the hydrolysis time and the base type on the particles morphology and texture was evaluated. The new silica materials were characterized by FTIR-ATR, SEM (Fig. 1), EDS, TEM, powder X-ray diffraction, thermogravimetry and ¹³C and ²⁹Si solid-state NMR.

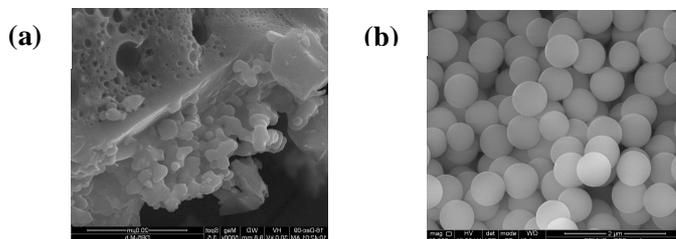


Figure 1: SEM images of silica particles prepared with different bases: a) triisopropanolamine and b) ammonia.

Acknowledgments: The authors wish to thank Evonik-Goldschmidt GmbH for providing the organosilane compound. This work was partially funded by Projecto de Investigação Científica na Pré-Graduação 2009, U.P. and Santander Totta, and by FCT and FEDER (Portugal), through project PTDC/CTM/108820/2008.

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Fast analysis of multiple pesticide residues in orange juice using dispersive liquid-liquid microextraction and heart-cutting GC-MS

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The presence of pesticide residues in juice fruits is an increasing matter of concern, given its widespread use in agricultural practices, and thus the possibility of raw fruits and water used in processing may be contaminated. In Europe as in many other countries in the world the maximum residue levels (MRLs) of pesticides are established only for raw agriculture commodities and not for processed products. However, recommendations on principles and practices to the establishment of MRLs for fruit juice and other processed foods are being prepared [1]. Taking into account the high consumption levels of fruit juices, the huge number of pesticides that have to be monitored, and the low levels expected, fast, selective, and sensitive methods are an imperative demand.

In recent years, there have been major developments in the extraction/clean-up processes, generally regarded as the bottleneck of the analytical schemes. One of the most compelling proposals was dispersive liquid-liquid microextraction procedure (DLLME) reported by Rezaee and co-workers in 2006 [2], a fast, simple, precise, and inexpensive microextraction procedure that proved to be very effective for the analysis of many compounds including some class of pesticides. The new technique uses only some μl of extraction solvent which are injected into the aqueous sample containing the analytes of interest along with a small volume (1 ml or less) of a dispersive solvent, providing good recoveries and very high enrichment factors for hydrophobic compounds, in a very short time. Given the compatibility of the solvents used, and the low volumes involved, the technique is easily associated with GC end-point determination, including faster and more accurate GC dual column techniques, such as heart-cutting GC.

In this work the development of a methodology for multipesticide analysis in orange juices based on a DLLME procedure coupled to a heart-cutting GC with mass spectrometry is presented. The experimental variables that affect the DLLME microextraction procedure and the chromatographic determination are discussed. Finally, the results obtained from the application of the method to orange juice samples acquired in the market are reported.

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Acknowledgments:

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Optimization of a methodology for determination of BPA and BPB using DLLME/heart-cutting GC-MS

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Bisphenol A (2,2-bis(4-hydroxyphenyl)propane; BPA) and bisphenol B (2,2-bis(4-hydroxyphenyl)butane; BPB) are chemicals widely used in the manufacture of consumer goods and products, including polycarbonate plastic food and drink containers. Due to their physicochemical properties, these substances can migrate from the packing to the food and consequently may cause a potential danger for health. According to literature BPA and BPB contribute for disorders like diabetes, cancer and obesity. Thus, the tolerable daily intake (TDI) for BPA was established at 50µg/kg of body weight/day by the U.S. EPA and the European Food Safety Authority [1].

Rapid and simple methods are needed for analysis of these substances in food and drinks. The dispersive liquid-liquid microextraction (DLLME) recently developed can attain to these criteria. DLLME is based on formation of a cloudy solution by the rapid addition of extraction and disperser solvents into an aqueous sample containing the analytes of interest. The hydrophobic solutes are then enriched in the extraction solvent which is dispersed into the bulk aqueous solution, and then centrifuged. These procedure is fast, simple and have a high enrichment factor when compared with the usually procedure used in extraction of BPA and BPB [2].

The objective of the present work was to develop and validate a heart-cutting GC-MS method based in the DLLME for the determination of BPA and BPB in canned soft drinks. The experimental variables that affect the DLLME procedure such as amount and nature of extractive (trichloroethylene, chlorobenzene, carbon disulfide, tetrachloroethylene, isooctane, carbon tetrachloride, toluene, dichloromethane) and dispersive (methanol, acetone, acetonitrile) solvents were optimized. Different derivative reagents were also tested in order to obtain high yields. The best results were obtained using 0.5 ml of acetonitrile with 30 µl of tetrachloroethylene and 30 µl of acetic anhydride as reagent derivative.

From twenty samples analyzed, in general all had BPA ranging 0.10-1.21 µg/l. The BPB was present in some of the sample in levels ranging 0.11- 0.26 µg/l.

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Acknowledgments:

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Optimization of a HE-SPME-GC/MS method for screening of volatile compounds in espresso coffee

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The consumer's interest for espresso coffee has increased during the last few years not only in Italy but also in other countries, namely, in Portugal and Spain. The espresso coffee is appreciated due to its potent aroma, and flavour. These attributes are directly related to the volatile compounds produced during roasting. The presence of defective coffee beans depreciates the beverage quality. Considerable research dedicated to the volatile fraction of roasted beans has been carried out. More than 800 volatile compounds are listed for coffee when it is roasted. However, there are virtually no reports on the study of the headspace of espresso coffee.[1,2]

The objective of the present study was to optimize a HE-SPME-GC/MS method for screening of volatiles in espresso coffee and use it on the evaluation of the influence of roast conditions of coffee beans with different percentages of defect (50, 60 and 73 % defective beans).

Twenty-five ml of espresso coffee samples were prepared directly to 50 ml vials. Extracts were prepared from about 8 grams of coffee through which purified water of 88-95°C has been forced at 9-10 atmospheres of pressure for a brew time of 20 seconds. The espresso dripped out of the porta-filter like warm honey, have a deep reddish-brown color, and a crema that made up 10% of the beverage. Volatiles extraction and concentration was performed by solid phase micro-extraction (SPME) of the espresso coffee headspace, using a carboxen-polydimethylsiloxane (CAR-PDMS) fiber. Analysis of the volatile profiles was performed by GC-MS.

The constituents were identified by comparing the experimental spectra with those of the US National Institute of Standards and Technology (NIST) 1998 data bank 1.6, USA). Based on the peak resolution, their areas were either calculated from the total ion current or estimated from the integrations performed on selected ions. The results obtained showed that the proposed methodology was reproducible and adequate for extraction, concentration and analysis of espresso coffee volatiles. Statistical analysis of the data by principal components (PCA) demonstrated that the volatile profile enables the differentiation of defective coffees.

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Structural, interfacial and rheological properties of different formulations for a commercial liquid detergent

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The growing demand for Liquid Detergents (LD) with enhanced properties requires a continuous investigation and development of novel formulations in order to meet consumer expectations by the manufacturers [1]. The introduction of new raw materials for formulation enhancement requires in turn fundamental knowledge in the physical chemistry of colloids and interfaces, namely in interfacial activity, detergency, foaming, wettability, colloidal stability and viscosity [2].

Our work aimed at the physico-chemical characterization of different formulations of a commercial LD produced by Procter&Gamble, with the ultimate goal of reducing production costs. The active ingredient is a mixture of anionic and zwitterionic surfactants, with the composition expressed as the weight ratio of anionic to zwitterionic compound ($R_{A/Z}$). The cost reduction is obtained with an increase of $R_{A/Z}$, i.e. with a decrease of zwitterionic surfactant concentration. However, this causes a concomitant decrease in the colloidal stability and performance (efficiency of soil removal) of the LD. Hence a balance is needed between these conflicting factors.

In the first stage of this work the microstructure of the concentrated detergent formulations—lamellar liquid crystal phases—was characterized by light microscopy, cryogenic scanning electron microscopy (Cryo-SEM) and small angle X-ray scattering (SAXS). We have found that the rate of the dilution process is correlated with the paste morphology. Differential scanning calorimetry provided further information on the phase transitions of the pastes. In the second stage, we characterized the diluted LD formulations (final products) by rheometry and tensiometry (Whitelmy plate method).

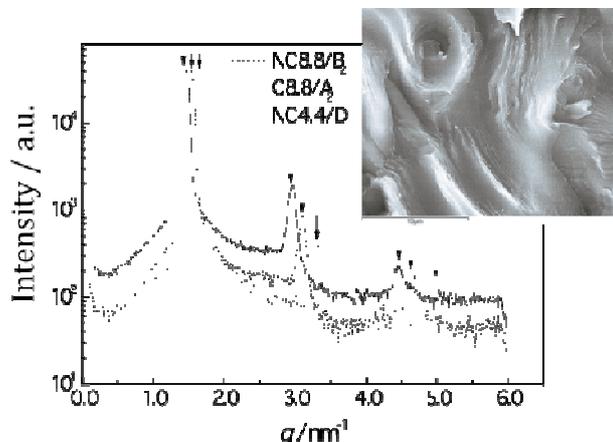


Figure 1. Representative X-ray diffractograms and cryo-SEM micrographs of the detergent paste, evidencing a lamellar liquid crystal microstructure.

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Parallel Oral Sessions IV

A3 Renewable Energies

Hydrogen generation and storage by successive loadings of reactant stabilized sodium borohydride solutions to feed a PEM fuel cell for portable applications

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Due to the accelerate decrease of fossil fuels resources and the continuous growth of energy demand, the development of alternative and clean renewable energy carriers is of the utmost importance. The transportation sector and other portable applications are areas where an alternative energy source may have a particularly great impact. In this context, hydrogen (H₂) is presented as an environmental friendly energy vector which can be used directly in a proton exchange membrane (PEM) fuel cell to generate electricity, producing water as a by-product.

Chemical hydrides are materials that produce hydrogen 'on demand' through a chemical reaction with water; and generally, they exhibit greater gravimetric energy densities and are stable during long periods of storage without usage. Among the chemical hydrides, sodium borohydride (NaBH₄) has the advantage of storing H₂ in a stable and safe solution. Its hydrogen content is of 10.6 wt%, making it one of the highest hydrogen containing compounds. NaBH₄ reacts with water to generate molecular hydrogen according to the hydrolysis reaction shown in equation (1):



Ideal hydrolysis is attained for $x = 0$ [1], but in practice excess of water is required accounting for the fact that the solid by-product can exist with varying degrees of hydration [2]. In this work it is shown an experimental investigation of eight successive loadings of alkaline NaBH₄ solution for H₂ generation under pressure, performed in a batch reactor, using a bimetallic powdered catalyst reused between 226 and 233 times!, under uncontrolled ambient conditions. Vigorous magnetic stirring was allowed during the formation of H₂ by injection of the 8th loading of reactant, to study the effect of agitation on H₂ generation rate.

The results of H₂ generation of eight successive loadings of 10 mL of reactant solution: 10 wt% NaBH₄, 7wt% NaOH, 83 wt% H₂O, in the presence of ~0.45 g of catalyst, proved that the studied system produce high H₂ pressure and can be generated in large amounts sufficient for use in a low power PEMFC single cell and stack. Additionally, the vigorous stirring of the solution inside the reactor during the 8th refuelling reveals minor reaction induction time and a slight higher yield in H₂ generation, indicating possible mass transfer limitations during the course of reaction between the fuel and the active sites of the catalyst.

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Single walled nanohorns modified by oxidation treatments as catalyst supports for fuel cells

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The support used in the electrodes of fuel cell polymer membrane (PEMFC) is very important. These carbon structures can affect significantly the electrochemical activity of the cell. Thus, the effectiveness of this activity depends on the amount of catalyst that can be stored in carbon supports. In that way, it was sought to compare and replace the commonly used carbon black (CB) by other carbon structures: the single walled nanohorns (SWNH). These have been a subject of great interest in recent years due to their electrical properties. The SWNH are a new class of carbon with a similar structure to graphite and have the ability to produce clusters around 100 nm in diameter. When these aggregates are used as electrodes in a fuel cell, not only the surface area is extremely large, but also the gas/liquid permeate easily, making access to the catalyst quickly and effectively. Moreover, the comparison between the performance of PEMFC electrocatalysts supported on SWNH showed an increase of 60 % at 50 ° C in comparison with a CB support. [1, 2]

This study focused, mainly, on the influence of the surface area of SWNH on the deposition of Pt electrocatalyst. As SWNH have a pentagonal area, easily oxidized, it was used two types of oxidations to increase its surface area: oxygen treatment at high temperatures and acid treatment under reflux conditions. The changes made were characterized by different types of analysis: termogravimetric analysis (TGA), surface area (BET) and Scanning Electron Microscopy (SEM).

It was concluded that the SWNH oxidized by the oxygen treatment process provided a surface area ca. [4] times larger than the unmodified SWNH. For the SWNH oxidized by the acid treatment process, despite they showed an area ca. [3] times higher than unmodified SWNH, they have become chemically fragile and the morphology has changed.

Regarding the deposition of Pt, the target load chosen was 20 wt.% Pt. Increased efficiency of deposition was observed in the oxygen treated SWNH (20 wt.%), followed by the CB with a similar BET area as the unmodified SWNH (18 wt.%), the unmodified SWNH (16 wt.%) and finally the acid treated SWNH (5 wt.%).

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Third generation photovoltaic cells in the classroom

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These solar cells, also known as Grätzel cells, are mainly composed of an organometallic dye, a nanocrystalline semiconductor (typically, titanium dioxide), an electrolyte solution (Iodine), two glass electrodes with a transparent conductive layer (TCO), and a catalyst (platinum or graphite). The principle of operation is also quite elegant. State-of-the-art dyes respond to visible and near infrared light of wavelengths ~400-900 nm [2], thus exciting electrons of the valence band of the dye molecules. The semiconductor receives the electrons from the photo-excited dye which is thereby oxidized. These electrons are conducted through the TiO₂ nanoparticles and reach the counter-electrode by an external circuit, thus generating power. The oxidized dye then accepts electrons from I⁻ ions of the electrolyte (dye regeneration), which is in its turn oxidized to I₃⁻ ions. The cycle is closed with the I₃⁻ conversion to I⁻ at the counter-electrode side. Thus, in this process the dye molecules play an important role: they are responsible for light harvesting, ultimately generating electrical current. In nature, some fruits, flowers, leaves and even bacteria may be used as pigments for this kind of solar cells as they show various colours. The present project aimed at implementing a simple DSC manufacturing procedure for laboratory classes using natural dyes extracted from blueberry and blackberry juices, and also red wine. Their photoactivity belong to the anthocyanin family, natural compounds that give colour to fruits, vegetables and plants [3].

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Design and Simulation of Biodiesel Production Processes

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Biodiesel is currently the most important alternative diesel fuel in EU, contributing to reduce the external dependence on fossil fuels and simultaneously the environmental impacts of the transportation sector, since it emits substantially lower quantities of most of the regulated pollutants compared to mineral diesel. However, biodiesel industry has some important problems. In particular, feedstock selection can have a profound impact on the production processes but also on food prices. Additionally, the conversion of forests and other critical habitats for biodiesel feedstocks cultivation have several associated damages (in biodiversity, soil quality, among others). For those and other reasons the use of waste vegetable oils can be an effective way of minimizing some of the negative impacts linked with biodiesel production and at the same time valorise a hard to treat residue.

In which concerns biodiesel production the transesterification reaction is very sensitive to the feedstock purity usually requiring some pre-treatment operations. Unlike the refined vegetable oils, waste oils and animal fats have a lot of impurities, especially of free fatty acids (FFA) and water that can reduce the chemical reaction rate by several orders of magnitude and the selectivity to biodiesel. Also, FFA cannot be converted to biodiesel, forming instead soap that further complicates the separation of phases.

In this work, the conventional alkali-catalyzed transesterification process to produce biodiesel from waste vegetable oils is studied in detail, using the chemical process simulator ASPEN Plus®. Two possible alternatives are considered: with and without a pre-treatment step that includes the esterification of FFA. The potential environmental impacts (PEI) of both alternatives are evaluated and compared based on the quantification of fugitive and open emissions and using the Waste Reduction (WAR) algorithm developed by U.S. EPA [1]. The economic potentials of both process alternatives are also assessed to provide an opportunity to identify possible relationships between economic potentials and the PEI [2]. Results show where the economic optimum and minimal environmental impact occur and what are the trade-offs between the two designs.

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Prediction of Raw-Material Characteristics Aiming Biodiesel Production

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In the last decade, the utilization of biodiesel has increased significantly mainly due to its renewable characteristics as fuel; for countries like Portugal, that do not have the traditional energy sources, there is the additional advantage of being possible producing at least part of their energy demand using their own raw materials. It also should be mentioned the environmental advantage of using biodiesel concerning climate changes, through the reduction of greenhouse gas emission. Nevertheless, as the first used raw materials for biodiesel production (rapeseed, soybean, sunflower, and palm oils) compete with the food market for the use of the soil, new raw materials need to be developed aiming the biodiesel production. The use of wastes like waste vegetable oil has showed to be very promising. Considering that the biodiesel quality must obey international standards and that it strongly depends on raw material characteristics, the determination of raw material characteristics must be performed efficiently, which means with rigor but using quick and not expensive processes. Therefore, the development to predict raw material characteristics is of indubitable interest. The main objective of this work was to predict the dynamic viscosity of different raw materials as a function of temperature (T), in order to save money and time. For that, the density (ρ) was determined using a pycnometer at 30, 60 and 90 ° C. Kinematic viscosity (ν) of oils was determined according to ISO 3104:1994 using the technique of flow in a capillary viscometer using a Cannon-Fenske apparatus. With the density and kinematic viscosity values, the dynamic viscosity (μ) was calculated:

$$\nu = \mu \frac{\text{mm}^2}{\rho \text{ s}} \quad (1)$$

The obtained results obeyed the following model, with correlation coefficients ranging 0,9972 and 0,9973:

$$\ln \mu = A + \frac{B}{T} \quad (2)$$

Based on the experimental work done, a safe and quick prediction of the dynamic viscosity of the three oily raw materials studied can be performed through the following equations:

Raw material 1 $\mu(T) = 0,918 \exp\left(\frac{2,942 \times 10^3}{T}\right)$ (3)

Raw material 2 $\mu(T) = 2,769 \exp\left(\frac{2,916 \times 10^3}{T}\right)$ (4)

Raw material 3 $\mu(T) = 2,525 \exp\left(\frac{2,954 \times 10^3}{T}\right)$ (5)

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Biodiesel Production from Tallow, Lard and Poultry Fat

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The gradual depletion of the world petroleum reserves and the environmental burdens associated with fossil fuels exhaust emissions stimulated the search for cleaner, renewable and more sustainable energy sources. Biodiesel has become more attractive due to its potential environmental benefits, reducing global warming and due to the fact that it is made from renewable energy sources.

The cost of biodiesel, however, is the main hurdle to its commercialization. The increase in price of most vegetable oils have yet encouraged the use of low-priced waste sources for biodiesel production and not used for human food, such as waste animal fats. The real challenge here is to have access to enough amounts of feedstocks to meet the current demands, without compromising sustainable development.

This study aims to assess the viability of using three types of waste animal fats (tallow, lard and poultry fat) for biodiesel production and to evaluate the obtained biodiesel quality, by comparison to the limits defined by EN 14214 (2003). The following quality parameters are quantified and compared for the three types of animal fats: acid value ($\text{mg}_{\text{KOH}}/\text{g}_{\text{sample}}$), iodine value ($\text{g I}_2/100\text{g}_{\text{sample}}$), kinematic viscosity at 40°C (mm^2/s), density at 15°C (kg/m^3), water content (wt %), flash point (°C), copper corrosion (3h/50°C), higher heating value (MJ/kg), cold filter plugging point (°C) and fatty acid composition (wt %).

There are several routes to obtain biodiesel from lipidic feedstocks. In this study the most common route is used, that is the transesterification of triglycerides with low molecular weight alcohols (commonly methanol) in the presence of a homogeneous alkali-catalyst (KOH) and operated in a batch mode. To perform the reaction an excess of methanol must be used in the presence of the alkali-catalyst to shift the reaction to a maximum yield of biodiesel product. It is recommended a methanol to alcohol molar ratio of 6:1, at reaction temperature of about 60°C.

The alkali-catalyzed transesterification reaction is very sensitive to the presence of free fatty acids (FFAs) and water in the lipidic feedstocks. Animal fats are typically more saturated than vegetable oils and usually have a high FFAs content. When an alkali catalyst is added to these feedstocks, the FFAs react with the catalyst to form soap and water. The soap formation does not only consume catalyst, but also causes emulsions to be formed, which decreases the reaction conversion to biodiesel. In addition, the animal fats have poor cold-flow properties that may prevent them from being used in cold climates. To overcome these disadvantages, blending of biodiesel to diesel is usually done. In Portugal it is possible to commercialise B100 (100% biodiesel) and blends up to B20 (20% biodiesel and 80% diesel) according to the national legislation. Thus in this work, biodiesel obtained from the three types of animal fats are blended up to 20% with diesel and the relevant quality parameters are evaluated.



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Parallel Oral Sessions IV

A4 Sport Sciences I

Application of critical velocity in swimmers anaerobic training

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About 80% of swimming events are equal or shorter than 200 m, making the anaerobic metabolism contribution very important in this sport. For a better use of anaerobic energy it is necessary to enhance the training at high intensities [1]. Thus, the practical application of anaerobic training appears as a necessary mean to enhance swimmers performance in short events [2]. Recent studies showed high relationships between the critical velocity calculated based on short distances (AnCV) and anaerobic swimming events [3]. The purpose of this study was to apply the AnCV new concept to an anaerobic training set, and to verify the consequent metabolic response.

To assess the individual AnCV, ten junior and senior male swimmers (20.2 ± 3.25 years old; $x \pm y$ training units per week) performed four front crawl distances (15, 25, 37.5 and 50 m) at maximum velocity, with 30 min rest intervals. AnCV was considered as the slope of the linear regression equation established between distance and time. Afterwards, swimmers performed 6x50 m at each individual AnCV (4 min interval), being collected capillary blood samples from the ear lobe after each 50 m repetition, at the 1st and 3rd min of recovery, to assess blood lactate concentration ($[La^-]$).

Mean \pm SD values of AnCV (ms^{-1}) in the total sample corresponded to 91-95% of the maximum swimmers velocity. In the training series protocol, the velocity was kept constant throughout the repetitions, with no drop in performance that would prevent the realization of the entire swimming set. The values of $[La^-]$ found at the end of each 50 m followed a quadratic function (fig. 1), growing very fast at an early stage and reaching the maximum value at the 4th repetition (15.8 mmol.l^{-1}). The values of $[La^-]$ at the end of each repetition suggested that this is a highly anaerobic training set that could be applied by coaches in their training processes.

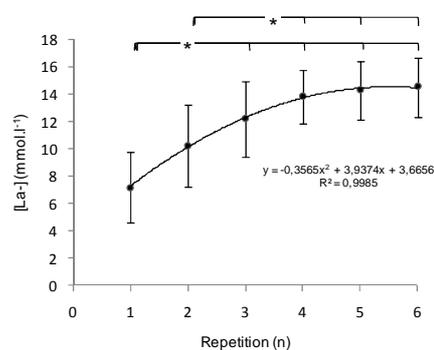


Fig. 1. Values of $[La^-]$ after each 50m at AnVC

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Adaptation to the Aquatic Environment in Swimming classes

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The scientific knowledge surrounding teaching swimming first phase - adaptation to aquatic environment (AAE) - is very scarce. Scientific data is almost inexistent and teachers mainly can count with some technical literature to help them in AAE teaching. The aim of the present study was to characterize the swimming AAE classes in Porto's metropolitan zone.

A survey was prepared and applied, after validation, to 82 teachers, being 45 males and 37 females. Subjects were active in the context of the AAE teaching of children between 6 and 10 years old. Teachers work both in private and public swimming pools. The survey included questions related to the teacher of AAE, the institutional organization of the AAE classes, the methodological organization of AAE process and classes, as well as the facilities and conditions surrounding AAE.

The main results pointed out that AAE teachers were young (31.6 ± 8.3 years) and of both genders. Academic graduation (PE Licensee) and professional relevant experiences were similar among teachers studied. The decisions related to the methodological organization of the AAE process were not consensual between teachers. This could have origin in the absence of consensus noticeable in swimming technical literature concerning to methodological decisions pointed. The absence of agreement in relation to methodology is not in conformity with the homogeneity verified in the academic graduation and experience of the teachers. During AAE classes, teachers are in the water with children. The AAE work seems to start with mobile floating devices. Teachers referred that they usually use diverse didactical material and that they use playful activities in their classes too. They understand it either as moments for fun with a motor purpose or moments for simply playing in the water. According to teachers, plays are used essentially in the final part of the classes and last between 5 to 10 min. Teachers appeal to the daily observation and to check lists in order to control and periodically evaluate AAE teaching process, and children achievements. When different learning levels co-exist in a class, teachers prefer to organize the teaching in accordance to each one of them. In what concerns institutional organization, swimming AAE classes occurred usually two times per week with mean durations of 30 or 45 min. In terms of facilities and didactical material, AAE classes are developed in shallow water for the children, with sufficient quantity and quality of didactical material that concurs to potentiate the aquatic achievements of the children.

Effects of acute endurance exercise on heart and liver mitochondrial function in rats treated with Doxorubicin

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It has been described that acute exercise is cardioprotective against the cardiotoxicity of Doxorubicin (DOX) [1], an anti-cancer agent known to cause mitochondrial dysfunction through oxidative mechanisms. The purpose of this study was to determine the effects of an acute DOX treatment on heart and liver mitochondrial function if an acute endurance exercise bout is performed 24-hours before DOX treatment. Twenty adult Wistar-male rats were divided as follows: non-exercised saline (NE+SAL), non-exercised DOX (NE+DOX), exercised-saline (EX+SAL) and exercised-DOX (EX+DOX). The animals performed a 60min exercise bout on a treadmill or remained sedentary 24h before receiving either a 20mg.kg⁻¹ DOX bolus or saline. *In vitro* heart and liver mitochondrial function (O₂, ΔΨ and cyclosporin A-sensitive Ca²⁺ accumulation) were evaluated. SOD, Caspase 3 and 9 activities as well as ANT, VDAC, Cyclop D, Bax and Bcl-2 contents were also measured. DOX treatment (NE+SAL vs. NE+DOX) significantly impaired cardiac mitochondrial function (state 3 respiration, phosphorylative lag phase, ΔΨ generation both with complex I and II-linked substrates and Ca²⁺ accumulation), which were reverted by exercise (NE+DOX vs. EX+DOX). Smaller alterations in liver mitochondrial bioenergetics after DOX treatment were not prevented by acute exercise (NE+DOX vs. EX+DOX). Exercise prevented DOX-induced increased cardiac caspase 3 activity but not caspase 9. DOX administration and exercise caused increased cardiac mitochondrial SOD activity. No alterations were observed in the measured mitochondrial permeability transition pore (PTP) and apoptosis-related proteins. These data demonstrate that acute exercise protects against cardiac mitochondrial dysfunction, preserving mitochondrial phosphorylation capacity and attenuating DOX-induced decreased mitochondrial tolerance to PTP opening by Ca²⁺.

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Calibration of accelerometer output for elderly

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Accurate assessment of quantity and intensity of physical activity (PA) is necessary when the relationship between practice and health benefits is being investigated (1). Different instruments have this aim. Accelerometers (ACL) supply information about the body acceleration, providing data about the amount, frequency and intensity of movement for extend periods of time (2). Most ACL studies were performed in children, adolescents and adult samples (3). The available literature contains different cut points to classify the level (intensity) of PA on those populations (3). However, in elderly people only recently ACL have been used as a direct method to assess PA and, when necessary, young adults cut points have been used to classify PA (3). This might probably incur in incorrect classification of PA intensity.

The purpose of the present study is to establish accelerometer count range corresponding to METs category for elderly, for light, moderate and vigorous PA. Data was obtained from 40 healthy women (mean age 66. 2) and 23 healthy men (mean age 66.3) during a treadmill exercise at 5 different speeds (4-6.5 km/h). Expired respiratory gases were collected, and oxygen consumption was measures on a breath-by-breath basis using a portable metabolic system, and METs was used as a direct method to assess the intensity of exercise, together with the accelerometer.

Results: activity counts and MET values were highly correlates ($r = 0,83$), and counts ranges corresponding to light, moderate and vigorous levels were ≤ 2148 (≤ 3 METs), 2149-4842 (3-6 METs), ≥ 4843 (≥ 6 METs) counts/min, respectively. A model to predict activity counts from METs values was developed (R Square = 0.71; SEE = 1127.44 counts/min. These data will provide a template on which patterns of PA will be classified into intensity levels using uniaxial accelerometer, for elderly people. It will be important to compare the patterns of PA using these ranges and the specific for young adults, in order to search for an underestimation of the results. Further studies are needed in order to assure that the 3 MET cut-off points is appropriate for elderly.

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Warming-up before sporting activity improves knee position sense

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Introduction: The effects of warm-up in joint position sense are not clearly established. We speculate that in response to mild exercise the sensitivity of mechanoreceptors would be increased, hence increasing the reflex neuromuscular protective mechanisms, the motor control, and the coordination, which in turn could be beneficial for performance and to decrease the risk of injuries during sporting activities. **Purpose:** To evaluate the effects of a warm-up program in knee JPS in karatekas. Additionally, this study also aims to compare the proprioceptive acuity when assessed in open versus closed kinetic chain. **Methods:** Ten young amateur karatekas (17.60 ± 4.03 years of age) participated in this study. Joint position sense was evaluated through active repositioning of the knee in open kinetic chain (OKC) and closed kinetic chain (CKC). The target and the repositioning joint angles were measured before and immediately after the warm-up program. Knee angles were determined by computer analysis of the videotape images and reported as absolute and relative angular error. The warm-up program comprised 15 minutes of slow running, calisthenics and stretching exercises. **Results:** At rest no differences were observed between OKC and CKC in absolute and relative angular errors (Table 1). At rest, the karatekas showed a clear tendency to over-estimate the test position in OKC and to under-estimate the test position in CKC. After the warm-up program, a significant decrease in absolute angular error was observed only in CKC ($p=0.04$). Additionally, in CKC the subjects reduced the relative angular error to approximately zero and decrease the variability of the responses, expressed by the decrease in standard deviation of the relative errors.

Table 1 Knee joint position sense (degrees) before and after the warm-up program (values are mean \pm standard deviation)

		Absolute Error	Relative Error
Baseline	OKC	4.15 ± 1.57	2.43 ± 3.44
	CKC	3.43 ± 1.99	2.05 ± 3.49
After warm-up program	OKC	3.38 ± 2.03	3.25 ± 2.20
	CKC	$1.84 \pm 0.49^*$	-0.01 ± 1.58

* Significantly different from baseline; $p < 0.05$

Conclusion: The warm-up program had positive influence on knee JPS. At rest, both kinetic chains seem to be equally effective to measure knee proprioception. Although the evaluation of the effects of warm-up on knee joint position sense using only an open kinetic chain technique could not provide a clear picture of the valuable role of warm-up.



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Parallel Oral Sessions V

A1 Biological & Health Sciences: Physiology II

Acute Haemodynamic Effects of Tezosentan in rats with monocrotaline –induced pulmonary hypertension

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Introduction: Tezosentan, a short-acting intravenous (iv) dual endothelin-1 (ET-1) receptor blocker [1], may be useful for acute haemodynamic control in patients with chronic pulmonary hypertension (PH). Our goal was to evaluate the haemodynamic effects of tezosentan in monocrotaline (MCT)-induced chronic PH.

Methods: Wistar rats (180-200g) were randomly injected with either 60mg.Kg⁻¹ MCT or vehicle, subcutaneously. Thereafter a subgroup of MCT-injected rats was gavaged daily with 300mg.Kg⁻¹ bosentan (M+B, n=13) while another subgroup (M, n=20) and control rats (C, n=7) received vehicle. At the 28th day after injection, and 24 hours after interrupting bosentan, right (RV) and left ventricular (LV) pressures were continuously recorded after thoracotomy under anaesthesia with fentanyl and sevoflurane, mechanical ventilation, and 0.6 mL.Kg⁻¹.h⁻¹ saline as fluid replacement. Tezosentan was administered in cumulative iv doses of 0.5, 1, 2, 5, 10, and 20mg.Kg⁻¹, after stable effect of the previous dose. Statistical analysis was performed by two-way repeated measures ANOVA. Quantitative variables are presented as mean ± SEM.

Results: During follow-up, 63% and 46% of M and M+B rats died, respectively, and 1 rat from group M died during haemodynamic evaluation. Compared with C, RV systolic pressure (SP) and relaxation constant τ were increased in M and M+B, while LVSP was decreased in M. RVSP was dose-dependently reduced by tezosentan in M (from 58.8±1.0, at baseline, to 48.6±1.0 mmHg, with 20mg.Kg⁻¹) and M+B (51.1±1.1 to 40.0±1.3 mmHg), with no change in LVSP or heart rate, while no changes were observed in C (32.7±1.0 to 31.2±1.0 mmHg) (Fig. 1).

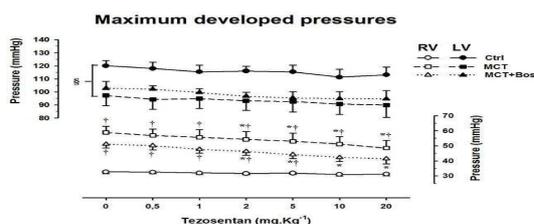


Fig. 1 – Haemodynamic effects of tezosentan.

Discussion: Tezosentan acutely reduces RVSP in chronic experimental PH. This effect is preserved despite previous chronic ET-1 receptor blocker therapy. Tezosentan may prove to be useful for haemodynamic handling of PH patients during cardiac surgery or in critical care.

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Binding and Neurotoxicity Profile of Chromone Based Adenosine Receptor Ligands

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Adenosine receptors (AR) comprise 4 G-protein-coupled subtypes: A1, A2A, A2B and A3. The A2B subtypes is widely distributed throughout the body, and typically expressed at low levels (Baraldi et al. 2008 Pur. Signal. 4). Novel, selective A2BAR antagonists are required to determine A2BAR role in inflammatory (e.g. asthma, rheumatoid arthritis) and angiogenic (e.g. diabetic retinopathy, cancer) diseases (Kalla & Zablocki 2009 Pur. Signal. 5). Discovery of novel A2BAR agonists is prompted by possible use in erectile dysfunction treatment, and protection from infarctions (Cohen et al. 2008 B. Res Cardiol., 103). Here we report the AR binding and neurotoxicity profile of a novel chromone-based ligands library (PT. Pat, 103665, 2008; WO. Pat, 2008104925A1, 2008). The library includes chromone-2-carboxylic acid (Crom1) and carboxamide derivatives (22A, 24A, 25A, 26A and 27A), plus chromone-3-carboxylic acid (Crom7) and its derivatives (11A, 19A, 20A, 21A and 23A). AR affinity was determined by radioligand binding assays, evaluating displacement of: 2nM [3H]-DPCPX from cloned A1 in Euroscreen cells, 3nM [3H]-ZM241385 from cloned A2A in He-La cells, 25nM [3H]-DPCPX from cloned A2B in HEK-293 cells, 30nM [3H]-NECA from cloned A3 in He-La cells. Neurotoxicity assays were conducted in rat striatal neurons 24h after treatment with AR ligands. Population viability was analyzed by tetrazolium salt (WST-1) metabolism. Neurite retraction and compound micro-insolubility were assessed by phase-contrast microscopy. Mechanisms of acute toxicity in single neurons were investigated by real-time monitoring of intracellular Ca²⁺ and mitochondrial membrane potential ($\Delta\psi_m$; Oliveira & Gonçalves 2009 JBC 284). Crom1 and Crom7 exhibited low affinity for all AR, without detectable neurotoxicity. Crom7 derivatives exhibited high affinity for A2BAR (>50% radioligand displacement at 10 μ M). A2BAR affinity constants (K_i) were: 23A=1.4 μ M, 19A=2.9 μ M, 21A=6.4 μ M, and 11A=8.5 μ M (all with higher affinity for A2B than A1, A2A or A3). Among Crom1 derivatives, 27A presented the highest A2BAR affinity (44% radioligand displacement at 10 μ M), with lower affinity for other AR. Crom1 derivatives 22A, 24A, 25A and 26A exhibited no detectable neurotoxicity, but microcrystal formation was detected at \geq 50 μ M. 27A induced minor neurite retraction, insufficient to impact WST metabolism. Crom7 derivatives 20A and 19A formed micro-crystals, and were neurotoxic (neurite retraction and reduced WST metabolism) at >25 μ M. 11A and 21A exhibited neither micro-crystals nor neurotoxicity up to 100 μ M. 23A was the most toxic of all compounds without micro-insolubility, and was further tested for toxicity mechanism. Acute exposure to 100 μ M 23A progressively disrupted Ca²⁺ homeostasis, induced neurite blebbing, and collapsed $\Delta\psi_m$. Structure-toxicity analysis evidenced that all neurotoxic compounds had hydroxyl groups, linking them to the toxicity mechanism. In summary, 21A and 11A up to 100 μ M exhibited no micro-insolubility, nor any signs of neurotoxicity. 11A is the most promising candidate for further development as selective A2BAR ligand given its lower affinity for A1AR and A2AAR (less than 3% and 2% radioligand displacement at 10 μ M, respectively).

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Negative inotropic effect of angiotensin 1-7 and its role in myocardial function after ischemia-reperfusion

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Angiotensin 1-7 (Ang1-7) is a bioactive heptapeptide of the renin-angiotensin system (RAS) and has received an increasing attention for its ability to balance angiotensin II actions in the cardiovascular system [1], mainly through the binding to Mas receptor. The heart was identified as one of Ang1-7 main targets and both angiotensin converting enzyme 2, the main enzyme responsible for its synthesis, and Mas receptor are highly expressed in this organ, so this new RAS axis may have a key role on cardiac physiology [2]. In the present study we aimed to evaluate Ang1-7 acute myocardial effects and to assess its ability to modulate myocardial function in an ischemia-reperfusion model.

Right ventricular rabbit papillary muscles were immersed in a modified Krebs-Ringer solution and electrically stimulated (1.8mM Ca²⁺; 35°C; 0,6Hz). In a first phase, increasing concentrations of Ang1-7 were added in the following conditions: (1) baseline, with intact endocardial endothelium (EE); (2) after selective removal of the EE with Triton X-100; and (3) in the presence of the Mas receptor antagonist A-779, the AT₁ receptor antagonist ZD-7155, the AT₂ receptor antagonist PD-123,319 or the NO synthesis inhibitor NG-nitro-L-arginine (L-NA). In a second phase, we added Ang1-7 or the same volume of H₂O (control) to the superfusing solution, followed by 30 min of ischemia (95% N₂ and 5% CO₂) and 40 min of reperfusion (95% N₂ and 5% CO₂). The contractile response to increasing concentrations of isoproterenol (10⁻⁸–10⁻⁶M) was then evaluated. The results are presented as mean±standard error (p<0.05).

Concerning the effects of Ang1-7 on myocardial contractility, we observed a significant decrease in active tension (AT), dT/dt_{max}, peak shortening and dL/dt_{max} of -10.5±3.6%, -8.0±3.0%, -5.3±2.6% and -5.7±2.3%, respectively, without a significant change on relaxation parameters. The presence of ZD-7155 or PD-123,319 did not alter these effects. However, Ang1-7 effects on myocardial properties were abolished after selective EE removal and in the presence of A-779 or L-NA. However, the pre-treatment with Ang1-7 improved the inotropic and lusitropic responses to isoproterenol, with a more marked increase of TA, dT/dt_{max} and dT/dt_{min} in Ang1-7 group when compared to the control group (434,4%±169,1% vs 238,6%±65,8%, 525,9%±126,6% vs 373,4%±98,8% and 552,9%±183,4% vs 333,2%±99,8%, respectively; 10⁻⁶M isoproterenol).

In conclusion, in this animal species, Ang1-7 through its binding to Mas receptor induces a negative inotropic effect modulated by the EE and NO and independent of AT₁ or AT₂ receptors activation. Since they are influenced by the EE, these effects may be disrupted in situations associated to endothelial dysfunction like heart failure. In addition, in this ischemia-reperfusion model, Ang1-7 improved the inotropic and lusitropic response to beta-adrenergic stimulation. These results support Ang1-7 potential beneficial effects in the contractile dysfunction associated with ischemia.

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ATP is a non-invasive biological urinary marker of overactive bladder syndromes

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Although the potent biological action of ATP on most cell types is well established, the source of extracellular ATP and the mechanism by which cells release the nucleotide are still a matter of debate and also prone for pharmacological manipulation. Exocytotic release of ATP occurs at neuronal synapses. The mechanism underlying nucleotide release in cells devoid of regulated exocytosis is still inconclusive. Connexin hemichannels may function as a conductive pathway for ATP release [1]. Members of the ATP-binding cassette transporters have been proposed as an alternative mechanism of nucleotide release in non-secretory cells. Inflammation and mechanical perturbations (e.g. shear stress, stretching) stimulate ATP release from many different cell types, including rabbit urinary bladder cells. Data from our lab demonstrated that in both rat and human urinary bladders nociceptive mechano-sensory transduction occurs via ATP released from the urothelium by the distension or distortion of the organ, which then activates P2X₃ and/or P2X_{2/3} on subepithelial sensory nerve terminals [2]. In vitro studies demonstrated that uroepithelial cells and cholinergic nerves from overactive human bladder samples (OAB) release more ATP than controls, which subsequently causes hyperactivity of cholinergic nerves and the detrusor [3]. We, therefore, hypothesized that urinary ATP could be a non-invasive biological marker of functional bladder hyperactivity in human patients, providing that the urothelium is not damaged. For comparison purpose, we also measure the amount of nerve growth factor (NGF) in urine samples, as this compound may also be increased in human hypertrophic bladder.

A total of 39 women participated in this study (20 OAB and 19 controls). Two urine samples were collected and freeze-preserved for ATP and NGF determination. Urinary ATP was measured by bioluminescence using an ATP kit (Roche) and NGF content was determined by RIA (Promega). Age-matched controls were tested biochemically (e.g. urinary creatinine, pH, LDH, ionogram) and by uro-cystometry and ecography to evaluate bladder hyperactivity and urinary residuum, respectively. Values obtained for urinary ATP and NGF were corrected appropriately. The urinary pH was not significantly ($P>0.05$) different in the two groups of samples (6.2 ± 1 in OAB and 6.9 ± 0.9 in controls). Urinary ATP was significantly ($P<0.01$) higher in OAB samples (7.23 ± 0.01 nM, $n=20$) than in controls (2.87 ± 0.01 nM, $n=19$); this was confirmed in the two urine samples collected for each individual. Differences in the urinary NGF determined for each group, OAB and control, did not reach statistical significance.

The results demonstrate that patients with OAB present higher urinary concentrations of ATP than the control group. It requires to be determined whether there is a correlation between the urinary ATP levels and the severity of OAB. We might, therefore, consider ATP as a non-invasive biological urinary marker of OAB syndromes.

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Relaxation of Human Penile Smooth Muscle by P2Y Purinoceptors is attenuated in patients with erectile dysfunction

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ATP acts as a potent relaxant agent in rabbit and human corpus cavernosum (HCC). Relaxation of HCC caused by adenine nucleotides may be partially attributed to the metabolic breakdown into adenosine by ecto-nucleotidases, through the activation of (smooth muscle) A_{2A} and (endothelial) A_{2B} receptors (Faria *et al.*, 2006, *JPET*, **319**, 405-413). Controversy, however, exists on the P2 purinoceptor(s) subtype(s) involved in HCC tone. Recently, we showed that P2 purinoceptor-mediated responses were attenuated in patients with vasculogenic erectile dysfunction (ED) (Faria *et al.*, 2008, *Nucleos. Nucleot. Nucleic Acids*, **27**, 761-68).

In this study, we aimed at characterizing the P2 purinoceptor subtypes responsible for relaxation of HCC samples collected from organ donors (control subjects) and from ED patients submitted to surgery for implantation of penile prosthesis. The Ethics Committees of HGSA and ICBAS-UP approved all the procedures. Isometric muscle tension was measured from longitudinal strips of HCC pre-contracted with 1 μM phenylephrine. In some of the experiments, adenosine deaminase (0.5 U/ml) was present in the incubation fluid in order to inactivate endogenous adenosine.

The rank potency order for relaxation of HCC strips from control individuals was (IC₅₀ μM): ADP(30)~ADPβS(30)>ATPγS(100)~2-MeSATP(100)>ATP(300); UTP and UDP (0.3 μM-1 mM) caused only a partial (<50%) relaxant effect. In ED patients, ADP and ATP relaxations were significantly (P<0.05) attenuated compared to controls (IC₅₀ values of 30 μM vs 100 μM and 300 μM vs 1 mM, respectively). Also the stable adenine nucleotide analogues, ADPβS (30 μM) and ATPγS (30 μM), and UTP (300 μM) had their relaxation effects decreased to a maximum of 20%. Both in controls and ED subjects, the concentration-response curve of ADP (0.3 μM-3 mM) was significantly (P<0.05) shifted to the right in the presence of the selective P2Y₁₂ receptor antagonist, MRS 2395 (10 μM). While selective P2Y₁ (MRS 2179, 0.3 μM) and P2Y₁₃ (MRS 2211, 3-10 μM) receptor antagonists were virtually devoid of effect in control subjects, these compounds significantly (P<0.05) attenuated the relaxing effects of ADP (0.3 μM-3 mM) in ED patients. ADP-sensitive P2 purinoceptors may be differentiated by their coupling to certain second messengers, such as phospholipase C (P2Y₁) and adenylate cyclase, either inhibiting (P2Y₁₂ and P2Y₁₃) or stimulating (P2Y₁₁) this enzyme. Inhibition of phospholipase C with U 73122 (3 μM) or adenylate cyclase with MDL 12330A (10 μM) both failed to modify relaxation of HCC caused by either ADP (0.3 μM-3 mM) or ADPβS (0.3 μM-300 μM) in control subjects; but they significantly (P<0.05) attenuated the relaxing effects of adenine nucleotides in ED patients.

Thus, relaxation of HCC by P2 purinoceptor agonists is severely attenuated in ED patients as compared to controls. Relaxation of the HCC in control subjects may be mediated by ADP-sensitive P2Y₁₂ receptors, while we observed a yet unexplained shift towards the activation of P2Y₁ (and perhaps P2Y₁₃) receptors in ED patients.

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Parallel Oral Sessions V

A2 Agronomy

Flowering and fruit-set in *Vitis vinifera* L. cv Aragonez

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In a *Vitis vinifera* L. vineyard, located in the Douro region (North of Portugal), some plants of the cv Aragonez (Tinta Roriz) showed different floral morphological characteristics from this and other cultivars of the same genus. Flowers presented short pedicel, almost sessile; the corolla at anthesis did not form a calyptra (apical dehiscence), the filaments were short, the stigma was sessile, the ovary was globose, and the nectaries were under developed.

The pollen morphology, examined using light and scanning electron microscopy, was radially symmetrical, isopolar, tricolporate, with sexine much thicker than nexine and reticulate tectum.

A comparative study between plants with atypical and normal flowers showed low fruit-set and productivity with smaller fruits and no or few seeds, in the former. Also, the analysis of chemical parameters of the berries showed differences. Genetic analysis of chloroplastidial microsatellites revealed no polymorphism among these plants. [1]

This is the first report of the occurrence of these atypical *Vitis vinifera* flowers in Portugal, although in other countries it has been described in different cultivars. [2-4]

Further works as pollen fertility, carpel function and other studies for comparison with previous results, are needed to better understand this phenomenon.

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Evaluation of the quality retention in mushrooms of the genus *Pleurotus* by image analysis

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Mushrooms of the genus *Pleurotus* are the third most produced worldwide [1]. One serious problem which affects several mushrooms in terms of quality is their browning after 3-4 days [2]. Moreover, its high respiration rate, associated with loss of water and bacterial contamination [3], make it necessary to develop a package which can reduce these effects, leading to an above average quality retention. This needs to take into account parameters like colour, texture, loss of electrolytes, appearance, weight loss and respiration rate.

The computerized image analysis of colour degradation and water loss parameters were the main variables studied. An automatic image capturing system of mushrooms *Pleurotus ostreatus*, placed in a controlled environment, was built. Information was extracted from these images by software techniques (ImageJ and Adobe Photoshop) and analysed with statistical methods. Discrepancies between real and camera colour values were checked with colorimeter. In order to remove time dependent random colour variations of the camera sensor, background colours were used as control.

A reduction of the values of the four colour parameters tested (Red, Green, Blue and Grey) over time was detected and associated with a reduction of the mushroom quality. Relationships between quality and the area, width and length were also found, with these being reduced as the time after harvest increased.

These data and subsequent methods of analysis are indicators for the evaluation of the efficiency of the package, as well as for the most suitable packaging and storage conditions, in order to extend the shelf life of this produce.

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Evolution of antioxidant activity on minimally processed garlic (*Allium sativum* L.) cloves

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The use of garlic (*Allium sativum* L.) in therapeutic applications, particularly for prevention of cardiovascular diseases and as anti-carcinogenic, as well as in cooking, is widely disseminated throughout the World. This product is rich in sulphur compounds considered responsible for its therapeutic properties, with allicin being the most abundant, with a medicinal importance provided at levels above 4.5 mg per gram of dried garlic [1]. However, sulphur compounds are very unstable, decomposing easily during the processing of garlic. The effect of different disinfection treatments, as alternatives to chlorine, has been investigated on the quality retention of minimally processed garlic stored at different temperatures. Previous studies have proven that freshly diced garlic cloves, sanitized by dipping in a 5% solution of H₂O₂, for 2 minutes, and stored at 4 °C, under ambient air, could adequately retain their quality up to 10 days [2]. The present study aimed at studying the effect of disinfection with hydrogen peroxide against the classical use of hypochlorite, regarding antioxidant activity (DPPH method [3]), total phenolics (Folin-Ciocalteu method [3]) and allicin content (HPLC method [4]). Garlic cloves were peeled, washed in tap water at 0 °C and cut into small cubes: app. 0,5x0,5x0,5 cm, submitted to one of the following treatments: hypochlorite or hydrogen peroxide (H₂O₂), and centrifuged to remove excess water, when needed. The samples were stored at 4, 8 and 12 °C. The results indicate a decrease in the levels of allicin over time of storage, while antioxidant activity and total phenolics increased. The use of hydrogen peroxide, when compared with hypochlorite has no significant effect on total phenolics, while it has a detrimental effect on both allicin content and antioxidant activity.

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Development and validation of a HPLC/UV methodology for nitrate and nitrite quantification in vegetables

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Freeze, freeze-dried or oven-dried are the usual procedures described in literature for storage of vegetables before nitrate and nitrite analyses ^[1-2], but there is no information related with reliability of these processes. A rapid and cost-effective HPLC/UV method was validated and used to select the most appropriate extraction procedure to eliminate chromatographic interferences and to evaluate the influence of different sample pre-treatments on the accuracy and reproducibility of the results obtained.

Non-edible parts of each sample were removed and vegetables (spinach and lettuce) were frozen at -20°C during 6 hours. Then, samples were cut, homogenized and divided in three lots. The first lot was analysed fresh (less than 24 hours after collection), the second lot was frozen during two weeks, and the third lot was freeze-dried and sifted through a pore less than 500 µm. Additionally, fresh vegetable leaves were taken and dried in a force air oven to 70°C for 48h as described by Castro *et al.*^[1]. The dried leaves were then ground in a mill and sifted through a pore less than 500 µm.

ANOVA analysis at the 95% confidence level shows that there is significant difference between results obtained by different sample pre-treatments for spinach and for lettuce. Similar nitrate concentrations were obtained for fresh and two weeks frozen samples. Freeze-drying and oven-drying pre-treatment of the spinach and lettuce material was inappropriate. Activated charcoal was efficient to remove interferences from vegetable matrices. No nitrite was detected in fresh, freeze-dried, oven-dried and frozen spinach or lettuce, this is not surprising because it has been shown that nitrite concentrations in fresh, well-stored vegetable tissues are extremely low and under frozen storage of vegetables, nitrite accumulation was inhibited ^[2]. Reproducibility of the measurements was evaluated by intra-day and inter-day analysis. Relative standard deviation values were in general less than 3%. The average recovery for nitrate was 102.1% and for nitrite was 100.3%, indicating the method is quite accurate ^[3].

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Concentration of cadmium by lettuce grown in Oxisols

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Cadmium (Cd) benchmark values in soil aiming to prevent the contamination of soils and plants were proposed by the Environmental Agency of the State of Sao Paulo, Brazil - Cetesb [1]. However, studies are needed to validate these estimates of contamination potential or provide guidance for intervention strategies in already contaminated areas. The objective of this study was to evaluate the concentration of Cd in root and leaf of lettuce plants grown in soils contaminated with Cd.

The experiment was conducted under greenhouse conditions in Piracicaba-SP. Lettuce plants were cultivated in pots filled with 3 dm³ of two Oxisols (Typic Haplustox and Rhodic Hapludox), using a randomized block design in a factorial scheme 5 x 2 (five rates of Cd and two soils) with three replications. The treatments consisted of: 0.0; 0.5, 1.3; 3.0 and 6.0 mg Cd dm⁻³ soil, based on the guideline established by Cetesb [1], added as CdCl₂·H₂O. Adequate amounts of CaCO₃ and MgCO₃ (Ca:Mg ratio of 3:1) were added to increase soil base saturation (BS = 80%). Only the Rhodic Hapludox was fertilized. The lettuce plants were harvested and submitted to nitric-perchloric digestion for determination of Cd by ICP-MS. Data were submitted to analysis of variance and polynomial regression, using the SAS system of analysis.

The relationship between Cd concentration in root and Cd application rate fitted a linear model for Typic Haplustox ($Y_{TH} = 7.8906x + 2.5562$; $R^2 = 0.98^{**}$) and quadratic model for Rhodic Hapludox ($Y_{RH} = 4.7842x^2 + 3.3702x + 3.1844$; $R^2 = 0.99^{**}$). The relationship between Cd concentration in leaf and Cd loading rates followed a quadratic model for both soils (Fig. 1). In the treatments with 1.3 and 3.0 mg dm⁻³ of Cd, were verified in lettuce leaf (fresh matter) grown in Typic Haplustox, 0.6 and 1.65 mg Cd kg⁻¹, respectively (considering 97% of water in the lettuce). To the Rhodic Hapludox, were verified concentrations of 1.2 and 2.25 mg Cd kg⁻¹ in fresh matter, respectively. These values indicate the lettuce contamination, in which being consumed may cause risks to human health according to Anvisa (critical level of 1.0 mg Cd kg⁻¹ fresh weight). The current “prevention” values of soil contamination for Cd, proposed by Cetesb, were somewhat restrictive but may still result in Cd concentration in the edible parts of lettuce above the permitted level established by food legislation.

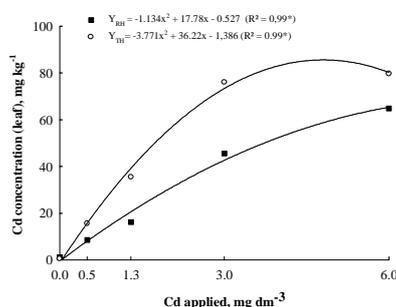


Figure 1. Concentration of Cd in lettuce leaves in function of soil types (■ Typic Haplustox; ○ Rhodic Hapludox), and rates of Cd applied.

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Screening of isoflavones levels in several wild Portuguese *Leguminosae* using matrix solid-phase dispersion (MSPD) and HPLC/DAD

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Isoflavones (3-phenyl chromones) are plant secondary metabolites displaying numerous biological activities in vertebrates among which estrogen-like activity is one of most described in literature [1]. They are found primary in *Leguminosae* such as soybean and red clover. However the profile of isoflavones amongst species is quite variable (*e.g.* red clover contains mainly formononetin and biochanin A whereas soybean contains primarily daidzein, glycitein and genistein). Thus, the analysis of these compounds in plants is still a challenge for analytical chemists due to the wide range of amounts and type of molecules with different polarities which difficult their simultaneous extraction from the matrix. In a previous work a simple procedure which permits the simultaneous extraction of 12 isoflavones from the leaves of red clover was optimized [2]. This procedure is based on a matrix solid-phase dispersion (MSPD) methodology consisting on the simultaneously sample homogenization, extraction and clean-up, requiring a small sample size and minimal amounts of organic solvents. The isoflavones extracted were then identified and quantified by high-performance liquid chromatography (HPLC) coupled to a diode array detector.

The aim of this work was to explore the applicability of the referred MSPD HPLC/DAD method for the quantification of 12 isoflavones in several wild Portuguese *Leguminosae* species collected in several locations in the Portuguese territory. Samples of the species *Vicia sativa*, *Genista spp*, *Cytisus scoparius*, *Ornithopus compressus*, *Ornithopus pinatus*, *Medicago lupulina*, *Lotus edulis*, *Medicago Arabica*, *Lotus corniculatus*, *Pterospartum tridentatum* and *Ulex spp* were collected, morphologically identified, stored on desiccating silica gel and submitted to the overall procedure for isoflavones quantification. The isoflavone profiles of the referred plants are presented.

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Acknowledgments:

This research was supported by U.Porto /Santander Totta “Projectos Pluridisciplinares 2009”. S.C.C. is grateful to “POPH-QREN- Tipologia 4.2, Fundo Social Europeu e Fundo Nacional MCTES”. M.A. Faria is grateful to FTC for the Grant SFRH/BPD/20725/2004.

Discrimination of Port Wine categories based on analytical parameters: retrospective study

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The purpose of this work was to characterize different categories of Port Wine according to analytical parameters that are usually determined under the certification of Port Wines, carried out in the *Instituto dos Vinhos do Douro e do Porto, I.P.* (IVDP - Douro and Port Wines Institute). For this purpose, analytical data from 2000 to 2008 were obtained from the IVDP's database, which, after a description of the data structure, were subsequently treated applying a multivariate statistical approach: Discriminant Analysis, bearing in mind that the main purpose of a discriminant function analysis is to predict group membership based on a linear combination of the interval variables. Data regarding 18 analytical parameters from 620 randomly selected bulletins of previously evaluated Port Wines were used. For each of the two major Port Wine styles: (i) wines with oxidative ageing (Tawny style) and (ii) wines with a young character (Ruby style), this work allowed for the built up of statistical models, permitting differentiation, with a high percentage of correctly classified wines (over 80 %), of most categories belonging to either of those groups. Models were optimised through *stepwise* procedure retaining 9 variables (analytical parameters) for classification of Tawny's and 5 variables for classification of Ruby's, reduced to two dimensions explaining 98.9 % and 100 % of the data variability, respectively.

Acknowledgments:

Authors acknowledge the support given by the Direction of IVDP, I.P. that has provided the use of analytical data from the Institute's database for this study. M. L. Ferreira acknowledges the contribution given by Ana Faria, Bento Amaral, Natália Ribeiro and Tomás Simões from the IVDP, I.P., through thoughtful discussions during the evolution of this research project.

Consumer perspectives of fresh produce in local food markets

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Traditional food markets are an integral part of the urban/rural linkage. Nevertheless, in Portugal, those markets have shown a decrease in popularity, mostly due to the growth of organized retailing and increased globalization. Attempts have been made to find what motivates consumers to purchase locally produced foods. Proximity is associated with freshness, improved quality and reduced environmental impact. Some studies have attempted to assess their economic or social impacts at the community level and the most common findings were showing them as a place for social activity and promotion of a sense of community, in addition providing positive economic impacts for local business. The objective of this work was the characterisation of consumers from Portuguese traditional food markets, and the identification of their attitudes and perceptions towards those markets, aiming to identify opportunities and challenges of traditional food markets' retailers. Questionnaires were applied directly to consumers at traditional food markets from the North of Portugal, between December 2008 and February 2009. 144 consumers were questioned about shopping profile, reasons to visit the market, degree of satisfaction, as well as social demographic details. About 80% were female with an average age of 52 ± 15 years; almost 60% lived in urban areas near the market (less than 4 km away from the market). Over 60% of the consumers visited the market at least once a week. The most bought products on traditional food markets were fresh fruits and vegetables (88 and 82%) followed by fresh fish and flowers (38 and 37% respectability). The main reasons pointed out by consumers to visit these markets were: produce freshness (60%), price/quality relationship (34%) and the price of traditional products (34%). Moreover, results yielded an overall degree of satisfaction about shopping local food market, showing that with an adequate communication strategy more consumers could be allured to these markets.



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Parallel Oral Sessions V

A3 Chemical Engineering

Evaluation of Different Solvents for Oil Extraction from Grape seeds

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The interest on biodiesel as a renewable fuel for transportation emerged as a response to the current environmental concerns and also aiming to reduce our dependence on fossil fuels. However the most common feedstocks for biodiesel production, such as soybean oil, rapeseed oil, sunflower oil and palm oil, are also used in human food with the associated social and environmental impacts. It is therefore necessary to find new sources of biodiesel feedstocks to enable a sustainable future for the biodiesel industry. In this context arises the need to assess the ability of extracting oil from the grape seeds using different solvents, so that this oil is further considered for biodiesel production and as a potential substitute for the edible vegetable oils mentioned above.

One started by gathering the bagasse from the wine production, containing mostly grape seeds, grape peels and grape sticks. So, as a first step one separated the seeds from the remaining components of bagasse, which was carried out manually and also using a sieve. For this purpose sieves with two size screens were used: one for the finer contaminants (e.g. sand) and one for the coarser contaminants (e.g. peels and sticks). The second step was the crushing of the grape seeds in an industrial mill, until a thin and uniform particle size was obtained.

Thirdly, laboratorial tests were conducted for the grapeseeds oil extraction using different solvents in a Soxhlet device. The solvents tested include n-hexane, n-heptane, n-octane, cyclohexane, 1-propanol, 2-propanol, ethanol, methanol, and diethyl-ether. These solvents test were designed not only to measure the ability of each solvent to perform the oil extraction but also to compare possible differences in the oil content depending on the grape seed type, i.e. if from white or red grape varieties. To recover the solvent from the oil extracted a simple distillation was used.

Some properties of the oil extracted from the grape seeds were also determined, such as kinematic viscosity, determined using a Cannon Fenske viscometer, density, determined by the pycnometer method, the water content, determined using Karl Fischer coulometer, and the iodine number, determined by titration.

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Solvent-free enzymatic synthesis of decyl acetate

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This work has as main purpose the synthesis of decyl acetate by enzymatic catalysis in a solvent-free system (SFS). In SFS volumetric production is increased and, at the same time, the plant 'footprint' is reduced, making such systems especially attractive for industrial applications. Decyl acetate is a high added value product and finds applications in the food/fragrance and in the fragrance/cosmetic industries. In this work, it is synthesized by the transesterification reaction between vinyl acetate and decanol, using immobilized *Candida antarctica* Lipase B as catalyst (Novozym® 435). As the by-product of the reaction (vinyl alcohol) is very unstable and immediately tautomerizes to acetaldehyde, the overall reaction becomes irreversible:



Experiments are performed in a magnetically stirred glass flask immersed in a thermostatic bath, at the desired temperature. Bath and reaction temperatures are measured by K-type thermocouples. The catalyst particles are added to the reaction mixture once the reaction temperature is reached, initiating the reaction. The magnetic bars used are previously padded with soft paper to ensure that the particle size is kept constant throughout the reaction. A blank run was performed without the enzyme to ensure that the paper did not affect the reaction and no conversion was detected. Samples are withdrawn at given times for analysis, diluted 1:20 in hexane and analyzed on a gas chromatograph equipped with a flame ionization detector and an autosampler. N-decane is used as internal standard for the GC analysis and all the samples are analysed in triplicate.

The influence of several parameters, such as temperature, initial concentration of substrates and enzyme deactivation, is being studied. As an example, Fig. 1 shows the results obtained while varying the initial concentration of decanol.

Preliminary results show that the reaction rate is maximum for equimolar initial concentrations of decanol and vinyl acetate; increasing temperature (25–45 °C) resulted in higher reaction rates.

Acknowledgments:

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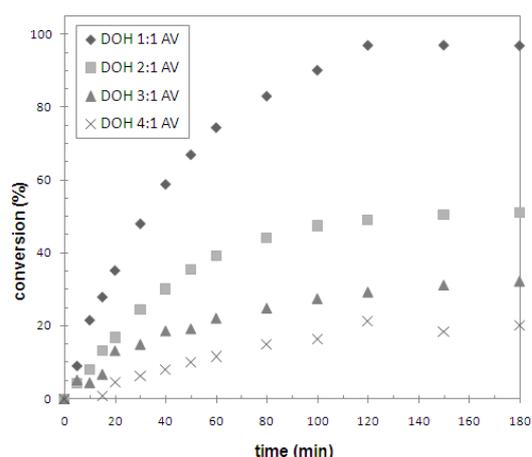


Fig. 1: Effect of the concentration of decanol on the conversion.

Nanocrystalline Zinc-Substituted Hydroxyapatite as Catalyst for Transesterification Reactions

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Zinc-substituted hydroxyapatite (ZnHAp) is known to improve the bioactivity of HAp [1] and have antibacterial effects [2]. Moreover, ZnHAp is used as a selective catalyst for transesterification reactions [3]. This work discusses the synthesis of nanocrystalline zinc-substituted hydroxyapatite by wet chemical precipitation through a continuous process using the NETmix® static mixer and reactor technology [4]. Calcium and zinc chloride, sodium phosphate and sodium hydroxide were used as reactants. ZnHAp was synthesized using both co-precipitation and ion exchange methods. The reaction was held at room temperature, while the subsequent 48h maturation stage was held at 60°C. The suspensions were then centrifuged, washed, dried, milled and calcinated in order to have the final powder catalyst. The catalysts were characterized in terms of particle size, superficial area, elementary chemical composition and XRD.

The influence of the preparation method, zinc content (from 0 to 50%) and calcination temperature (400°C, 600°C and 800°C) was analyzed in terms of the catalytic performance in the transesterification reaction of triacetin with methanol (6h, 80°C). Triacetin conversion, methyl acetate selectivity and catalyst deactivation were evaluated for all the prepared ZnHAp samples and compared to commercial anionic and cationic ion exchange resins. Samples prepared by the ion exchange method, with 30% zinc content and calcined at 400°C, proved to have better activity than the best ion exchange resins (Amberlyst 15 and Smopex 101, both acid resins); however, its deactivation rate is much higher than that of acidic resins (Figure 1).

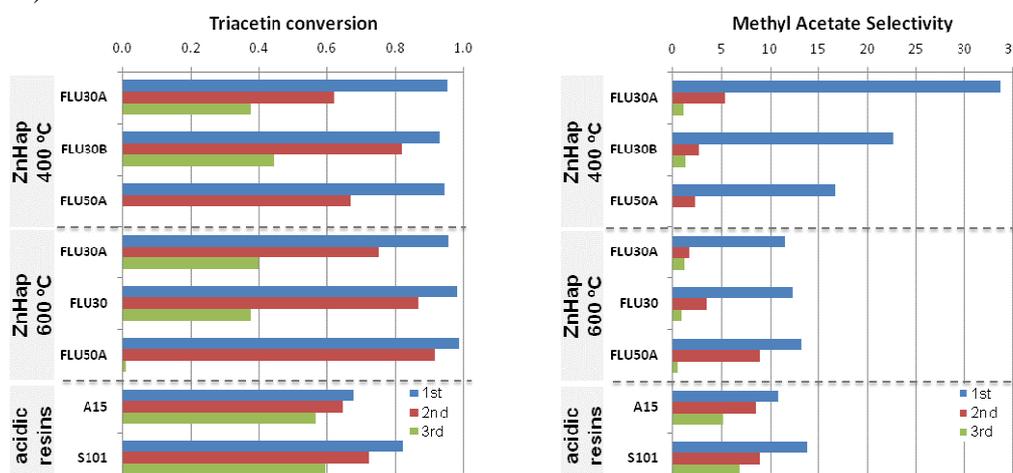


Figure 1. Catalytic performance of ZnHAp catalysts and commercial ion exchange resins.

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Study of a Gas/Liquid Reactor for the Vanillin production using CFD tools

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In the framework of “Product Engineering” discipline, whose purpose is to improve or create new products, by identifying costumers needs, generate and select ideas and manufacturing the product [1], it was our objective to use *Computational Fluid Dynamics* (CFD) in order to improve or to create a new design for the reactor used to produce vanillin at the Laboratory of Separation and Reaction Engineering. The reactor, an 8 litres bubble column, is constituted by several parts: the liquid stabilization chamber, gas distributor, reaction body, and the separation head. The main cylindrical body of the reactor includes a structured packing element, Mellapak 250.Y.[2]

Initially, experiences using CFD program, FLUENT, were conducted in order to identify the reactor flow problems. For this, 3D and 2D models were created for the G/L reactor using the program GAMBIT. Then, simulations were conducted for assessing the reactor hydrodynamics by analysing the velocities profiles in steady state and the residence time distribution obtained in tracer experiments in transient state.[3,4]

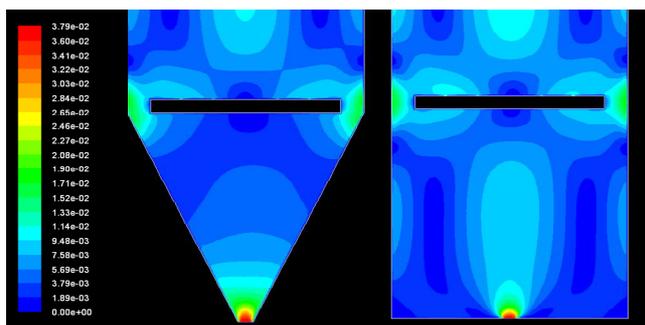


Fig.1. Velocity profiles for original (right) and proposed (left) liquid stabilization chambers geometries.

The tracer experiments showed that in both geometries the flow model was plug flow with axial dispersion [5]. The curves $E(t)$ and $F(t)$ were also obtained and the mean residence time was calculated for both geometries of the reactor: $6,03 \times 10^5$ and $5,73 \times 10^5$ seconds. For the visualization of the evolution of the tracer molecules inside the reactor, some pictures were obtained in transient state, and used to create a video for visualization of the time evolution of the tracer mass fraction along the reactor. A 2D model of the packing structure was created in order to study and to visualize the gas flow in the packing elements (see Fig. 2). The images obtained in the simulations showed that only a portion of the packing was used by the gas.

The simulations results (see Fig. 1) reveal flow problems due to the original geometry of the liquid stabilization chamber, particularly some recirculation areas and preferential flow paths, with an estimated dead volume of 13%. An alternative geometry was created leading to a 0.1% of dead volume.

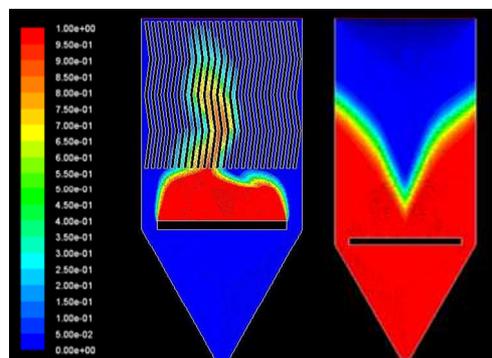


Fig.2. Transient state trace mass fraction for experiments with (left) and without (right) structured packing,

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Study and optimization of a multi-layer textile containing a heating band

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In activities requiring long exposures to cold environments, such as mountain climbing, the hands (and other parts of the human body) should be well insulated in order to optimize the climber's performance [1-3].

However, in cold environments (at high altitude), the use of highly insulate materials may not be sufficient to assure thermal comfort at body extremities and, thus, alternative solutions, namely electrically heating bands, may be required. This type of solution has, however, some limitations, such as those related to the battery weight, capacity, etc. Adequate attention must be given to these issues, as they are of critical importance for climbers.

In this study, a computational tool (COMSOL Multiphysics 3.5) was used to simulate numerically the heat transfer through a multi-layer textile containing a heating band (Fig. 1a), in order to optimize its performance.

Several parameters were studied for different environmental conditions, namely heating wire distribution, heating performance versus power consumption, battery duration, etc. For each environmental condition, the importance of conduction, convection and radiation transfer was assessed (Fig. 1d). The use of infrared reflective layers was studied as a way to minimize radiant heat losses.

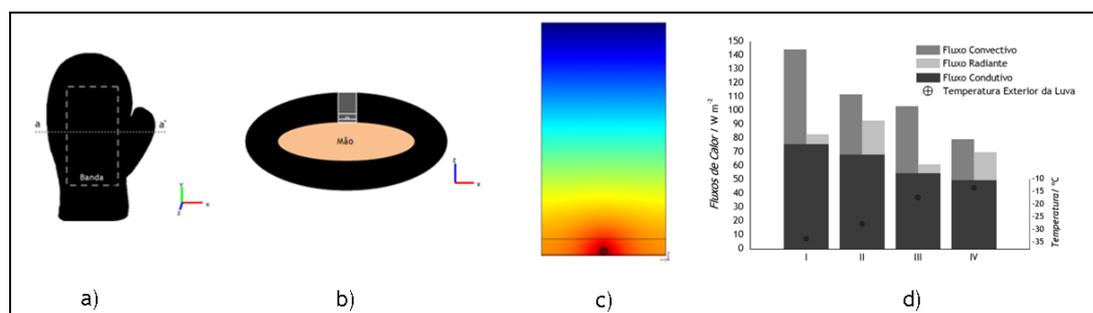


Fig. 2: a) heating band position in the mitt; b) transversal cut (aa') of the mitt; c) temperature distribution along the multi-layer textile and d) conductive, convective and radiant heat fluxes for the different environmental conditions studied

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Parallel Oral Sessions V

A4 Sport Sciences II

Overweight, Obesity, Physical Activity levels and Physical Fitness in children from Albergaria-a-Velha.

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Centile charts have been used over the years to assess growth rate, as the percentil returns information on a subject's location within a group or population. The increasing knowledge on overweight and obesity adverse effects on children's health, highlights the importance of centile charts on preventing such effects. On the other hand, not only fat mass, but also moderate to high values of health related physical fitness (HRPF) components are an important issue in children's active and healthy lifestyle.

Our purposes were (i) to present Albergaria-a-Velha's centile charts for height, weight and body mass index (BMI) from 6 to 10 years, (ii) to estimate overweight and obesity prevalences and PA levels, (iii) to present passing rates in HRPF levels, and (iv) to assess the influence of gender, age, PA levels and overweight/obesity prevalences in HRPF overall passing rates.

581 boys and 529 girls aged 6 to 10 years were evaluated. BMI was assessed. Fitnessgram test battery was applied. Overweight and obesity cut-off values of Cole et al. (2000) were used. PA levels were calculated by means of Godin & Shephard questionnaire. LMS method was used to centile estimation and charts were plotted in Excel 2007. Prevalences, confidence intervals and trends were calculated in PEPI 4.0. Logistic regression was computed in SPSS 15.0. Significance level was set at 5%.

We found that 31.6% of girls and 24.8% of boys are overweight, and 12.7% of girls and 13.9% of boys are obese. PA_{week} values are, on average, 73.43 (Mets / week) for boys and 62.92 (Mets / week) for girls. 11.9% to 28.2% of girls and 26.6% to 38.5% of boys are fit in all tests. Boys are fitter throughout this age range, with exception at 6 years old. No significant differences were found in boy's HRPF passing rates with age. Girls, however, exhibit significant decline from 6 to 10 years ($\chi^2_{(1)}=17.91$, $p<0.05$). Logistic regression analysis showed that girls ($CI_{95\%}=0.36-0.63$, $p<0.001$) have approximately half the chances of being fit than boys. Overweight ($CI_{95\%}=0.36-0.72$, $p<0.01$) and obese ($CI_{95\%}=0.12-0.37$, $p<0.01$) children tend to have more difficulties to be successful in all tests. Age ($p=0.068$) and PA levels (Moderate: $p=0.786$; High: $p=0.426$) are not significant predictors of HRPF passing rates.

Overweight and obesity prevalences are high. This, not only has an impact on future health status, but also leads to lack of success in physical fitness tests. No positive association between PA and HRPF was found. Age seems to have no impact on HRPF passing rates.

Influence of a physical exercise program in the levels of daily physical activity and functional fitness in elderly subjects of both genders

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Regular physical activity (PA) is an important contributor to a healthy lifestyle. Aging, however, is associated with a decline in PA level [1]. Therefore, exercise programs for the elderly are promoted to improve or maintain physical fitness and health [2]. Despite widespread use of accelerometers to objectively monitor physical activity among adults and youth, little attention has been given to older population [3].

The main goal of this study was to evaluate the daily levels of PA and physical and functional ability (PFA) of two groups of elder people, according to the regular practice of physical exercise (PE).

The sample comprised 36 individuals ageing 65 and more divided in two distinct groups: a group of practitioners (GP) and a group of non-practitioners (GNP). The PA levels were evaluated by accelerometry and PFA through the application of the Senior Fitness Test battery. After data analysis we used the student t-test for independent measures, the chi-square and the Pearson's correlation coefficient.

The results of this study show that a) there are no significant differences ($p < 0.05$) between the two groups, regarding the levels of daily PA; b) in the evaluation of the PFA, with the exception of the lower-limb strength component, there are no significant differences between groups; c) with the exception of other flexibility components and BMI, most of the elder from both groups were within the normative values, d) there are positive associations in the GP between BMI and the active time variables and light PA; and in the GNP, between the variables count's/ min and the strength of the upper limbs, and between the moderate PA and aerobic endurance.

These results suggest that this type of multicomponent PE program does not seem to be reflected, neither in the highest daily PA levels, nor at higher levels of PFA due to the absence of differences between practitioners and non-practitioners. However, our results show that both groups were very active and in general both groups are within the normative values proposed by Rikli & Jones [4], suggesting that this high levels of daily exercise can become a benefit in the maintenance of elder's functional capacity. Therefore, we conclude that regardless of the PE's structured practice, the elderly subjects should remain as active as possible in order to maintain the essential PFA for an independent and positive quality life.

This study was supported by grant: FCT/PTDC/DES/70261/2006

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The built environment and participation in physical activities in adolescents. The EPITeen cohort

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Low levels of physical activity (PA) in childhood have been associated with worse health outcomes which may have important consequences for future health status. Literature has shown associations between built environment and adult's physical activity. In comparison to the research with adults, we know little about the role of neighbourhood environment in relation to the PA behaviour of youth. The aim of this study is to examine associations between availability of "sports facilities" and their characteristics and participation on sport activities undertaken by a cohort of Porto adolescents.

This study has been developed as part of the EPITeen (Epidemiological Health Investigation of Teenagers in Porto) research project. We evaluated 1571 13-year-old adolescents enrolled at public and private schools in Porto and living at Porto municipality. Physical activity was assessed using a self-reported questionnaire. All public "sports facilities" in Porto municipality were visited by the research team to evaluate their characteristics and kind of sports offered. Participants were georeferenced in a Geographical Information System, using addresses, and a digital map of Porto municipality and "sports facilities" were georeferenced using a GPS. Buffers of 500m of radius were generated for each participant's house and we evaluated the number of sports facilities for each buffer.

In these 13-year-old adolescents, 49.8% reported practice some sport (38.8% in females and 62.6% in males, $p < 0.001$). According the frequency of practice, 28.2% of adolescents reported a practice of 2 or 3 times a week and 23.6% more than 3 times a week, the frequency was significantly higher in boys ($p < 0.001$). The proportion of adolescents with none "sports facilities" in a radius of 500m was 15%, 23% had one facility, 32% had 2 or 3 and 31% had 4 or more "sports facilities". The proportion of adolescents that practice a sport is similar according the number of "sports facilities" available, both in girls and boys. Also no significant differences were found according the frequency of practice. These results remained after adjustment for parents' education and even when we analysed only adolescents from public schools.

The availability of "sports facilities" did not change the probability to practice a sport neither the frequency of practice. The effect was similar according socio-economic categories. Further studies might explore possible associations between other characteristics.

Familial Aggregation of Physical Activity Levels

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Moderate to high levels of physical activity (PA) have been consistently associated with lower risk factors for several chronic diseases, especially of cardiovascular origin. However, epidemiological information reports that recommended levels of PA are not fulfilled by general population. PA and sedentary behavior (SB) are considered modifiable and multi-factorial risk factors. Nevertheless, there is compelling evidence to suggest that part of PA's and SB's variability is explained by genetic influence. Extended families designs, namely with three or more generations, are essential to learn more about genetic factors, and this type of research is almost non-existent in Portugal.

The aims of this study were: (1) to investigate the indirect presence of vertical transmission of genetic factors among members of three generations families and (2) to estimate the magnitude of additive genetic influences on PA and SB phenotypes.

100 extended families, covering three generations (n=1034), from the Lisbon area, Portugal, were evaluated. Phenotypes were assessed via the short version of the self-administered International Physical Activity Questionnaire (IPAQ-SF). Phenotypes available were: total physical activity (TPA); vigorous physical activity (VPA); moderate physical activity (MPA); walking; time spent in sitting time (ST) and watching television (WT) and PA levels classification. Body mass index (BMI) was calculated. The familial structure and phenotypes generic behavior among family members were analyzed in PEDSTATS software. Genetic component (h^2) and shared environmental effect were estimated using maximum likelihood implemented in SOLAR software package. The graphs were done in HLM *software, version 6.02*. Sex, age, sex*age, age², sex*age² and BMI were used as covariates. Significant level was set at 0,05.

Genetic component estimates (h^2) were: TPA $h^2=0,28\pm0,06$ ($p<0,0001$); VPA $h^2=0,35\pm0,06$ ($p<0,0001$); MPA $h^2=0,29\pm0,06$ ($p<0,0001$); walking $h^2=0,40\pm0,06$ ($p<0,0001$); ST $h^2=0,29\pm0,06$ ($p<0,0001$); WT $h^2=0,15\pm0,06$ ($p<0,003$); and PA levels determination $h^2=0,35\pm0,14$ ($p<0,007$). Shared environmental effect was not significant.

In conclusion, (1) there is significant familial aggregation in PA and SB phenotypes in this sample of three generation families; (2) genetic factors present low-to-moderate influences and environmental factors (non-shared) appear to be the major contributor to total variation in the available phenotypes.

The Sport Management in the curriculum of courses in physical education Amazon

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As Sarmiento (2008) to manage and monetize media. So it is for the manager to develop the sport of sport best way possible with the means to it available or from those that he will to discover, but this is only possible when there is a solid base of training, skills and competences fundamental to the functions of a manager of sport as Chelladurai (1999) requires knowledge of several areas, so this study aimed to verify the presence of sports management in professional training physical education of the Amazon and found that the sports management is not adequately presented in the students with subjects not as specific management sports, this is a poor training, generating professionals lacking the necessary skills to performance in this area.

This preliminary study seeks to verify the participation the disciplines of sport management in the grid curriculum of courses in physical education in state of Amazonas. He made a survey of curricula of courses through the web pages of their courses, identifying the name of the disciplines have some relation to the management of sport and their workload and the type of course that is, degree or bachelor's degree, there was also the grid curriculum of post-graduate management related sports offered in the state of Amazonas. In the state of Amazonas, verified is a deficit of studies facing the area of sports management. Crates curriculum of courses in physical education present in most cases, inadequately disciplines that has only something to do with the management sports, getting far away from the particulars of North American Society for Sport Management who cites: the field in sports, management and organizational competence in sport, ethics, marketing, communication, finance, economics of sport, sport law and policy sport, such as basic knowledge required the study area. Currently there is only one institution that offers post-graduate course in the broad sense in sports management at the state and despite having a curriculum satisfactory, it does not count in your faculty with no Master or Doctor of the area specific sports management which, according to Jones et al. (2008) is very worrying for the formation of managers of sport.

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For consistency between formation and practice ethics of the professional of sport

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This is a short reflection about the hole between the speech and the action in teaching sports. Given the undeniable unpredictability of the experiences in any sports and physical activities, oriented or not, there will be a better way to act; a more correct? Since some authors claim to be shy the presence of the deep ethics issues in the Physical Education formation, becomes necessary to change the panorama.

There are a lot of visions and perspectives about Ethics. Anyway, it always refers to the greatest and highest values, as the Good, the Correct, the Right [1]. Thus, how the professional action in Physical Education is essentially with people, in an educative relationship, become “imperative to support it on ethical principles” [2].

Nowadays, we live in a world of axiological relativism, where the teachers need increasingly interfering morally and ethically. The deontological code has been insufficient and the university seems don't give much importance to the ethics formation. Therefore, even its (university) contribution may be small, shall be done with excellence and the role educational of the educators on sports should leave the paper and come alive in practice.

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IJUP^{'10}
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Parallel Oral Sessions VI

A1 Biological & Health Sciences: Public Health and Population Genetics

Portuguese primary care evaluation through Prevention Quality Indicators

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Ambulatory Care Sensitive Conditions (ACSCs) are conditions for which timely and adequate outpatient care should prevent, at least in part, the need for hospitalization. Therefore, hospitalization rates for these conditions seem to be good measures of the quality of healthcare provided in an outpatient setting, especially in preventing medical complications [1]. After the seminal works of John Billings and others [2], the Agency for Healthcare Research and Quality (AHRQ) developed this concept into Prevention Quality Indicators (PQIs), which are area-level hospitalization rates for 14 selected ACSCs: diabetes complications, hypertension, perforated appendix, among others. Although these indicators use hospital administrative data, they provide information on the level of primary care on the community as a whole [1].

Using Portuguese inpatient hospitalization data (2000-2007) obtained from ACSS (Health System Central Administration) and demographical data obtained from INE (National Statistics Institute), we calculated the whole set of PQIs, following AHRQ guidelines. The country was divided into 5 regions – North, Centre, Lisbon, Alentejo and Algarve, and they were compared over time. Rates were standardized for age and gender using the Portuguese mean population for the period. PQIs and Regional Health Administration (ARS) expenses were also compared.

Striking, but not self-evident differences were found among regions. After standardization, Alentejo and North were the regions with better overall performance and also the regions with the best overall quality/expenses ratio. This regional heterogeneity may reflect actual regional variations on the pattern and standards of primary care, or be a result of coding issues, differences in urbanization, varying prevalence of predisposing conditions or risk factors and of propensity to seek care [3].

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Nutritional adequacy of a meal served at a Food Service University Unit

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Healthy eating requires a balanced intake of foods with an appropriate distribution of energy over the day, dual to individual energy needs.

Changing lifestyles has resulted in an increase of people who take their meals outside home and significant changes on type of foods consumed, determining an increased consumption of high energy density foods.

In this context, and particularly among student's community, the food service university units play an important role on eating habits, being responsible for providing adequate meals to the nutritional needs users. The correct planning of menus and the determination of food amounts per capita are essential in the nutritional intervention.

The aim of this study was to evaluate the nutritional adequacy of the lunch served at a food service university unit, based on the average per capita consumption in relation to the usual customer needs. For this purpose all foods served at a lunch were weighed. The average weight of meals component was converted into energy and macronutrients using the Food Portuguese Composition Table, and compared to energy and nutritional diary recommendations for a reference individual.

It was found that the average energy provided for lunch was 713 Kcal (28,5% of total daily energy - TDE) and the percentage of carbohydrate, protein and fat supplied were respectively 31,5%, 28% and 40,5% of TDE. These results are in accordance with other investigations drawn at some food services units.

We may conclude that the meal evaluated was nutritionally inadequate, since it was hiperproteic, hiperlipidic and poor in carbohydrates. The inadequacy of per capita amounts suggests the need of nutritional intervention strategies in a short time aiming to improve the quality of food served to student.

Screening and Assessment of Undernutrition: Impact on Hospital Funding

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Introduction: Disease-related undernutrition is a health care concern which remains under-recognized and under-treated. The absence of routine screening at hospital admission is one of the main reasons for this perennial problem. In order to implement undernutrition screening and nutritional treatment, it is important to evaluate the economic impact of undernutrition documentation held in medical records.

Aims: To assess the financial benefits of systematically screening and assessing patients at hospital admission and their documentation in clinical notes.

Methods: Systematic screening and diagnosis of undernutrition in patients consecutively admitted in oncology and multidisciplinary departments of an oncology hospital was performed using the Patient-Generated Subjective Global Assessment [1]. The diagnosis of undernutrition was documented in the clinical process and was considered for the codification of Diagnosis Related Groups (DRG) [2]. A test including undernutrition co-morbidity was carried out. Relative weight and price of DRGs with and without undernutrition were assessed [3].

Results: Forty-seven patients were evaluated, of those, 23 (48.9%) were undernourished. Only three of the aforementioned patients accounted for an increase in total hospital funding which came to €9,006.

Conclusions: The documentation of undernutrition in the clinical record had a relevant economic impact. This justified the resources implicated in the practice of routine screening of undernutrition and nutritional therapy with the aim of improving nutritional status in hospital patients.

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Municipality Inspection and Risk Analyses

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In order to guarantee the impartiality and efficiency of food official controls, the competent authorities must adopt methodologies that allow taking effective, appropriate and outlined measures. Although the European Commission and Codex Alimentarius advised competent authorities to adopt methodologies based on risk analyses, few risk assessment methodologies are known and those who exist can only be applied in some food sectors.

The present study proposes a risk assessment methodology to determine the control frequency to food establishments by the Sanitary Council Authorities. The created risk matrix was applied in the municipality of Oporto to diagnose and characterize the risk of food establishments.

The new risk matrix not only considers the Estimated Risk for each activity (ERA), but also examines the hygiene and sanitary of the establishment (Risk Class) target of control. For hygiene and sanitary assessment, we applied check-lists used by the Sanitary Council Authority of Oporto, which had been necessarily standardized. The establishment categorization according with the estimated risk for each activity was supported in data of Codex Alimentarius, Food Code of Food and Drug Administration (FDA), Food Safety Authority of Ireland and General Veterinary Department of Portugal (GDV).

This methodology was applied in 60 establishments of the municipality of Oporto from October 2008 to January 2009. The risk assessment proposed by GDV was applied in retail establishments of animal origin products (=20), and the risk categorization of FDA was applied in catering establishments (n=30).

The control frequency determined explain the risk level, which is obtained by crossing ERA with risk class. Results of hygiene and sanitary assessment stand out positively for retail sales establishments of animal origin products and restaurant and drink establishments with manufacture, in comparison with retail food and catering establishments with manufacture.

The application of the new risk matrix and further comparison with other risk assessment tools already existent for some sectors in analysis, arises from clear differences in the frequency of the stipulated control. Furthermore, the results obtained from applying the present risk matrix show the expressed needs of the studied hygiene and *sanitary* sample assessment. That doesn't happen with the other risk methodologies applied.

This study shown that food official controls at an autarchic level were possible to be carried in accordance with the risk, as shaped in Regulations (CE) no. 854/2004 and 882/2004 and supported by Codex Alimentarius, when used the recent risk methodology proposed. Additionally, this matrix evaluates all the activities in the same way, since the hygiene and sanitary assessment are standardization.

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Genetic characterization of Portuguese patients with Neurofibromatosis type 1

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Neurofibromatosis type 1 (NF1) is a common autosomal dominant disease with complete penetrance, but highly variable clinical expression. This condition is characterized by café-au-lait spots, axillary and inguinal freckling, neurofibromata, Lisch nodules, optic gliomas, distinct bone lesions and, in a subset of patients, learning disability/development delay. NF1 is caused by mutations in the *NF1* gene, one of the largest in the human genome. Mutations are scattered throughout the gene and include point mutations and small and large rearrangements, including whole gene deletions. In 50% of the patients mutations are *de novo*. *NF1* is located on chromosome 17q11.2, spanning over 250Kb, and is composed by 57 exons. Its product, neurofibromin, is a tumor suppressor protein, with 8,457 aminoacids.

Our aim was to collect a large sample of NF1 patients, with detailed clinical data, and perform mutation analysis of the *NF1* gene, in order to establish genotype-phenotype correlations. Nine Portuguese patients with a clinical diagnosis of NF1 were selected for *NF1* mutation analysis for diagnostic testing. Mutation screening was performed by PCR amplification of all coding and flanking regions, followed by bidirectional direct sequencing.

We found one frameshift mutation and one nonsense mutation in two different patients, respectively, c.1756_1759delACTA (p.Thr586ValfsX18) in exon 16 and c.3892 C>T in exon 29 (p.Gln1298X). Both mutations result in truncated proteins, much smaller than the normal neurofibromin.

Our sample of patients, although small, shows that neurofibromin truncated mutations may be frequent in Portuguese patients. NF1 has a large phenotypic heterogeneity and mutation screening in this gene can be invaluable to confirm and establish an early diagnosis, and to allow proper genetic counselling, including the offer of prenatal diagnosis.

The role of synaptic vesicles in migraine susceptibility

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Migraine is a common neurological disease characterized by recurrent headache episodes with associated symptoms such as nausea or sensorial hypersensitivity. It is known that migraine has a significant genetic component, but the genes responsible for common migraine predisposition have not yet been identified. One of the best approaches to study the genetics of a complex disorder, such as migraine, are association studies, which compare the frequency of single nucleotide polymorphisms (SNPs) in case-controls samples. There is evidence that the neurotransmitter systems play a pivotal role in common migraine pathophysiology. Recently, in our population an association between the *STX1A* gene and increased migraine susceptibility was found. *STX1A* encodes Syntaxin 1A, a component of the SNARE complex, crucial for the regulation of neurotransmitter release.

We are currently conducting a case-control association study, using a sample of 188 unrelated migraineurs and 287 migraine-free controls, age and ethnically-matched with cases. Benefiting from the presence of linkage disequilibrium (LD) between SNPs, 110 tagging SNPs are being studied with total coverage of common variation (with a frequency higher than 10%) in 16 genes (such as *SNAP25*, *STXBP5*, *SYN1*, *VAMP1*, among others), these genes encode proteins related with the synaptic vesicles fusion machinery.

The SNPs' frequency in the Central and Western European population were obtained resorting to the Hapmap (<http://www.hapmap.org/>), using Haploview to plot LD patterns and to select the tagging SNPs.

The SNPs in study were divided in sets, and genotypes are being obtained in five 22-plex multiplex SNaPshot® (Applied Biosystems) assays. SNaPshot® is a powerful, consistent, easy to use, with a relatively high throughput technique specifically utilized to genotype SNPs. Results are being analyzed with the Genemapper™ software.

The genotyping of all 475 individuals for 22 of the 110 SNPs is currently in an optimization stage, and a preliminary association analysis is expected soon.

When all SNPs from a gene are genotyped, haplotypic association analysis is also going to be done in order to assess the possible existence of a susceptibility haplotype.

Epistasis, which is often neglected in complex traits' studies, will also be taken in consideration and the presence of genetic interactions, based on functional relationships, will be analyzed in order to assess their role in migraine predisposition.

To acquire knowledge about association between genetic polymorphisms and migraine susceptibility is crucial because it can be useful as a starting point for more in depth studies, such as functional assays, and from a more practical point of view the determination of genetic risk factors for migraine can bring dazzling advantages in migraine diagnosis and treatment.

Mutational screening of *AXIN2* gene in a group of Portuguese families with maxillary lateral incisor agenesis

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Agenesis of maxillary lateral incisors (MLIA) is the absence of formation of deciduous or permanent lateral incisors due to disturbances in odontogenesis. MLIA is the most frequent type of hypodontia with a prevalence of 1.3% in the Portuguese population. In a previous study, we found evidence of familial aggregation of MLIA in a sample of Portuguese families suggesting the presence of a strong genetic component for this trait.

Odontogenesis is a complex mechanism mediated by genetic factors and is responsible for the determination of the position, number, shape and tooth size. Several genes have been identified as being expressed during odontogenesis in some signaling pathways. Variations in these genes could lead to abnormalities during odontogenesis resulting in tooth agenesis.

Several genes have been proposed as candidates for MLIA including *AXIN2*, an essential component of the WNT/ β -catenin pathway, which has been found to be responsible for severe familial oligodontia. In order to identify the genetic factors contributing to the MLIA phenotype we decided to perform a mutation screening of this gene in 12 patients with MLIA. We sequenced the entire coding region of *AXIN2*, after polymerase chain reaction (PCR) of the 10 exons and intron-exon boundaries, followed by direct automated DNA sequencing. Analysis of the electropherograms was performed with SeqScape v2.6 software. After mutation analysis no pathogenic alterations were detected. However, some polymorphisms were found, including two previously undescribed variants (c.1530G>A and c.1944T>C). Importantly, one missense mutation, Phe50Ser (rs2240308), was also found, but according to a bioinformatics analysis, this mutation is non-pathogenic, with no impact in protein structure and function.

Due to the non-pathogenic nature of the polymorphisms found, we could not conclude that this gene has a major role in MLIA in our sample. Nevertheless, we think it will be important to further assess a possible association of these polymorphisms with MLIA, in a larger case-control sample. Therefore, association studies will be an essential approach in the future research of candidate genes involved in susceptibility to MLIA in our patients.



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Parallel Oral Sessions VI

A2 Chemistry II

Quinolones as Metalloantibiotics: Surpassing Resistance? – Characterization of Binary and Ternary Complexes of Cu(II)-Enrofloxacin

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Enrofloxacin, a second generation quinolone, is, as other fluoroquinolones, a largely prescribed antibiotic due to its broad spectrum [1]. The quick development of resistance to antibiotics by microorganisms has led to the need for constant reinvention of these drugs, a context in which the metalloantibiotics can arise as a possible solution [2].

In this study, binary copper(II): enrofloxacin and ternary copper(II): enrofloxacin: phenantroline complexes were analysed, establishing their behaviour in aqueous solution both by dissolution of previously synthesized crystals [3] or by mixture of the aqueous components in stoichiometric proportions. Their antimicrobial activity against *Escherichia coli* ATCC 25922 and BL21(DE3) was tested and the binary complex showed an efficacy twice that of enrofloxacin alone, justified by the speciation diagrams previously constructed [3]. The ternary complex shows values of minimum inhibitory concentration (MIC) similar to those of the non-complexed quinolone.

MIC values determined for enrofloxacin and its ternary complex on a battery of porin-deficient *E. coli* BL21(DE3) mutants show different OmpF and OmpC dependence, which points to different intake pathways and seems to indicate a different translocation route for the antibiotic and the metalloantibiotic.

The overall results are quite encouraging and suggest that the study of the ternary copper complex as a potential new antibacterial agent is worth pursuing. In fact, the hypothesis that microorganisms resistant to pure fluoroquinolones could be sensitive to their metal-complex derivatives has previously been put forward [4].

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Computational Studies on the β -Galactosidase Catalytic Mechanism: Hydrolysis and Transglycosylation Reactions

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Galactooligosaccharides are functional food ingredients, combining prebiotic properties beneficial to the human health with valuable physico-chemical properties in food processing^[1]. Its production is carried out by β -galactosidase, which simultaneously catalyses the hydrolysis reaction of lactose into simple sugars^[2]. This enzymatic catalyst is extremely important for the synthesis and modification of carbohydrates, which have great interest to the food and pharmaceutical industries given their potential application in therapeutics.

In this work we have used computational methods to study the catalytic mechanism of hydrolysis and a set of distinct transglycosylation reactions of a retaining galactosidase, with atomic detail, with lactose as the natural substrate. The ONIOM method (BB1K:AMBER//B3LYP:AMBER calculations) was employed to deal with such a large enzymatic system. Such methodology can efficiently account for the stereochemistry of the reactive residues, as well as the long range enzyme-substrate interactions. The possible importance of the magnesium ion in the catalytic reaction was investigated and was found that indeed it catalyses the transformation, lowering the activation barrier by 14.9 kcal/mol. The calculations have shown that the formation of β (1-3) glycosidic linkages is thermodynamically very unfavorable. In contrast, the formation of β (1-6) glycosidic bonds is the most favored, in total agreement with the enantioselectivity experimentally observed.

The data have also clearly shown the importance of the enzyme scaffold beyond the first shell aminoacids in the stabilization of the transition states. It is fundamental to include explicitly the enzyme in computational studies.

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Towards an “intelligent” control of formaldehyde photochemistry

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Photoexcitation of H₂CO to the first excited singlet state (S₁) may lead to CO+H₂ (molecular dissociation) [1] or to H+HCO (radical dissociation) [2] in the ground state (S₀). In an attempt to draw some general mechanistic principles that could control which reaction products are formed to a greater extent, we performed a series of direct quantum dynamics studies involving the two states [3].

From these trajectories connecting reactants and products, we found a trend between the type of products formed and the geometry at which the system decays from S₁ to S₀. Typical values for the coordinates of crossing points that shall lead preferentially to H₂ or to H loss are presented in this work.

The importance of knowing these typical values is related to the possibility of designing future studies in which the system may be “intelligently controlled”, i.e., intentionally driven towards a given product by targeting an appropriate crossing geometry.

Acknowledgments: Support from FCT-Portugal (Grant No. SFRH/BD/36197/2007) and EPSRC-UK (Grant No. EP/F028296/1) is acknowledged.

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CARBOHYDRATE BINDING MODULES FROM FAMILY 11: Understanding the binding mode of polysaccharides.

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The direct conversion of plant cell wall polysaccharides into soluble sugars is one of the most important reactions on earth, and is performed by certain microorganisms such as *Clostridium thermocellum* (Ct). These organisms produce extracellular multi-subunit complexes, called cellulosomes that include a consortium of enzymes containing non-catalytic Carbohydrate-Binding Modules (CBM), that increase the activity of the catalytic module.

In this communication, we describe a combined approach by X-ray Crystallography, NMR1 and Computational Chemistry[1,2], that was used to understand the unknown binding mode of different carbohydrates (cellobiose, cellotetraose and cellohexaose) to the binding pocket of the family 11 CBM and to understand their mode of action.

The results obtained so far have shown that the binding interface of the CBM11 can only be occupied by one single polysaccharide chain, which is in agreement with other CBMs from type B. The central binding site has affinity for polysaccharides with more than four sub-units and there are four main residues that have a central role in this interaction: Asp99, Arg126, Asp128 and Asp146. Furthermore, there are three tyrosine residues, Tyr22, Tyr53 and Tyr129 that are crucial for the guiding and packing of the polysaccharide to the charged regions[3].

In this communication we shall also compared the structure of the CBM11 with other CBMs families from type B that it has been suggested to have similar binding activities and functions.

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Substrate recognition in HIV-1 Protease

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HIV-1 protease is a crucial enzyme for the life cycle of the human immunodeficiency virus, the retrovirus that triggers AIDS. It is well documented that HIV-1 protease mediates the cleavage of Gag, Gag-Pol and Nef precursor polyproteins and is highly selective concerning the set of twelve different amino acid sequences that cleaves [1].

However, the governing principles and physical parameters, which determine substrate recognition and specificity, remain poorly understood despite the many speculative proposals that abound in the literature. In fact, it has been difficult so far to circumvent the fact that protease's substrates share little sequence identity and lack an obvious consensus binding motif. We have used microsecond timescale MD simulations to quantitatively shown that some sequences of the polyprotein Gag-Pol that are not cleaved (non-substrates) have in fact a higher affinity to the active site of HIV-1 protease (figure 1) than a substrate, i.e., recognition is not governed by affinity to the active site. [2]

Based on a detailed analysis of the results and experimental data, we propose that the recognition is based on the geometric specificity of PR:Gag and PR:Gag-Pol multiprotein complex, that selects which residues lie in the specific position that makes them accessible to the active site for cleavage. [2]

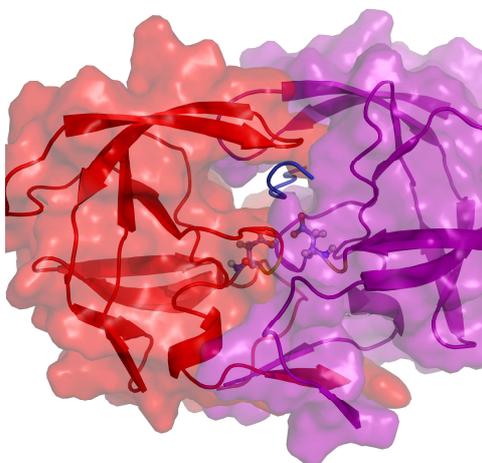


Figure 1 - Protease complexed with the Substrate ARVLAEAM. The Substrate and the two aspartic acid residues, one from each subunit of the dimer, have been highlighted.

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IJUP^{'10}
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Parallel Oral Sessions VI

A3 Electrical & Computers Engineering

Polyphase filter with continuous parametric tuning

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The world of wireless communication systems has been growing very rapidly. One aspect that helped this development was the CMOS technology, allowing smaller devices with evermore complexity. Nowadays, the pressure to build electronic systems with integrated circuits (ICs) is growing, driven by the need for better portability and low-cost prizes with high-level of integration, without compromising the performance. With this in mind, new receiver architectures have been favored in detriment of the classical ones with a high intermediate frequency (IF). In opposition, direct conversion and Low-IF receivers have been the focus of investigation in the area of radio frequency (RF) microelectronics and CMOS technology.

In RF receivers, the image frequency is one of the biggest problems to deal during frequency down-conversion. The polyphase filter is a way to avoid this problem, by suppression of the image signal.

The main purpose of this work is then to develop a polyphase filter to be used in a Low-IF receiver. This is a low-pass filter that is translated to a band-pass in the complex domain.

To diminish the area of the polyphase filter, the filter and hold (F&H) technique [1] is employed. The F&H allows a circuit time constant to be several times lower than original value needed to accomplish the specifications. For the low-pass prototype, a frequency cutoff of -3 dB at 530-KHz [2] was chosen to keep all the necessary information from the desired signal. This filter is then translated to 2-MHz, which is the value of the IF expected in the receiver. Using a duty-cycle of 10% and a clock of 50- MHz, the physical designed time constant was reduced 10 times while the performance of the polyphase filter is maintained. All the testing was done using an Active-RC implementation of the filter.

The next steps in this research are the selection of the OTA type for a *gm-C* filter implementation and, within, the filter architecture. To compensate for process deviations, a tuning system for filter calibration will be performed. Finally, the design of the circuit will be developed in a 0.35- μm CMOS process to prove the concept.

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Self-powered water purification module

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In a world with an ever increasing population, climate changes and contamination, potable water shortages are now one of the many problems that plague developing countries, which many times cause health problems, malnutrition and poverty.

Several water-purifying solutions exist, ranging from low-tech, low-performance to high-energy, high-cost implementations.

In this project we have evaluated simple, basic principles and combined them in a single solution: a particle filtering process and ultraviolet (UV) treatment. The reasons behind these choices are high-cost effectiveness, simple operation, and low maintenance.

Our device is a 60x50x80cm block that consists of a water tank with a capacity of about 150L with a filtering system that cleans the water as it is manually pumped out. The filtering system is comprised of a coarse filter at the tank input, a high density filter and UV light for disinfection. As the water is pumped, it passes through the high-density filter and then through a transparent helicoidal tube with an array of UV LEDs in the center, enclosed in a reflective cylinder.

Since this solution is targeted primarily to developing countries or emergency scenarios, where little or no infrastructures exist, the device needs to be self-sustainable. The device requires a source of mechanical energy for pumping the water through the filter, and electrical energy for powering the UV LEDs. By using a manual pump to produce water flow and a solar panel together with a sealed lead-acid battery, these requirements can be fulfilled.

Filtering is achieved using a high-density design, this is essential to eliminate foreign particles in the water that can be prejudicial and also reduce the effectiveness of the UV treatment. The amount of pressure required to pump the water through the filter, from the tank to the output, is provided by small manual water pump.

Based on existing studies [1], we concluded that UV LED lighting has enough fluency to disinfect water as it is pumped through the helicoidal tube. Although these types of LEDs have high power consumption, a high-efficiency solar panel on top of the device would provide enough power for UV purification and charging the battery for a timely backup.

In conclusion, despite some complexity of the UV disinfection system, the presented solution is feasible, could be manufactured at an affordable cost, and is ideal for deployment in deprived locations.

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Filter and Hold for PLL Applications

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The high performance of today's phase-locked loops (PLL) makes this circuit the preferred choice in a wide variety of devices such as in telecommunications and other electronic applications. One of the most important components of the PLL is the loop filter, which is usually characterized by a low cutoff frequency, making it difficult to implement. The Filter & Hold (F&H) technique addresses the need for a large time constant and thus could be useful as a loop filter in a PLL. The aim of this project is then to investigate the feasibility of using the F&H technique in a PLL loop filter.

The F&H methodology consists of gating the integration time of a circuit, during a τ second of a sampling period signal. The result is the multiplication of the time constants of the circuit by the inverse of the duty-cycle ($k=\tau/T$), which translates into a physical time constant with k times smaller value of the prototype circuit with the same response. Another great advantage of this circuit is that time constants can be controlled externally, after the circuit is implemented, by simply adjusting the duty-cycle. Since the time constant is usually related to capacitor values, the F&H prototype needs k times smaller capacitors.

We simulated a 2nd order F&H and an equivalent 2nd order low-pass passive filter using Cadence Virtuoso software. The former was implemented using a duty-cycle of 10%, making its capacitors 10 times smaller than the ones used in the regular filter. After analysis of both transient responses, we confirmed our previous conjectures since we observed the same time constants for both filters. Tracing the transfer functions also brought us to the conclusion that the F&H can attain the same behavior in terms of cutoff frequency, and it can be easily adjusted by modifying the duty-cycle, as shown in the following figure (plotted together with the equivalent 2nd order low-pass filter).

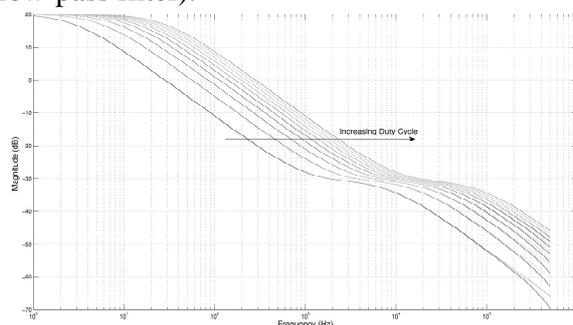


Fig.1: Bode Diagram for different duty-cycles.

Further analysis on the possibilities of the Filter & Hold will be conducted by implementing it in a PLL, using co-simulation between Simulink and Cadence. However, all the studies lead to the conclusion that the Filter & Hold is capable of providing the specifications the circuit might require, while offering important tuning advances.

Network based security for academic IC CAD environments

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In a typical academic environment for integrated circuit (IC) design, one does not always have access to a private network and must rely on the University's public infrastructure. Since the software and libraries used are often confidential and restricted to internal use, there is a need for a secure setup in an unsecure network to provide unified accounting, authentication, and storage.

This can be achieved by using available open-source, enterprise-grade solutions in a Linux environment.

Authentication can be handled by Kerberos V, and LDAP can be used to manage user information such as home location and user groups. For shared networked storage, OpenAFS is an excellent alternative to the unsecure NFS, providing features such as Kerberos integration and dynamic volume management.

The CAD IC design tool can also be shared, by using OpenAFS volume management, one can create read-only copies of CAD software volumes on several computers for load-balancing, and updates and patches can be applied and tested concurrently with current versions, and changes are propagated when needed.

This type of system can be centralized, using one server for all services, or distributed, using several servers for redundancy in case of failure.

Moreover, by implementing an automated installation service such as FAI, in case of critical failure on a workstation, one can easily reinstall the operating system and restore the machine to a known state. Since all services are networked, no important data is ever stored on the workstation itself, and nothing of value is lost. To create an environment even more independent of the University network, physical security services can also be implemented.

By using a standard magnetic or RFID card reader and electronic lock, access to the physical room can be given to specific users and all events can be logged. Networked video cameras can also be used to record any or all activity and upload it to a local and/or off-site location.

The proposed network infrastructure, using all of the above services and protocols, has already been implemented at the Microelectronics Students' Group at FEUP [1] and is currently running without any issues. All this provides a better user experience, since the user can login to any workstation by using their credentials and still have access to all software and personal data. By using these protocols and techniques, one can have a secure infrastructure on an insecure network, both at a virtual and physical level.

References:

[1] *Microelectronics Students' Group*, Department of Electrical and Computer Engineering, Faculty of Engineering, University of Porto, <http://cmos.fe.up.pt>

VORSat – Measuring a CubeSat Attitude from the Ground

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VORSat is an ongoing project of the University of Porto regarding the development of a CubeSat. This project appears from an invitation by the Education Office of ESA (European Space Agency), after a long time collaboration from both parts on a project regarding stratospheric balloons called Straplex. It is also part of the QB50 experiment with ESA, Von Karman Institute of Fluid Dynamics and NASA.

The purpose of this project is to prove the feasibility of measuring the satellite attitude from the ground based on a set of RF signals transmitted from orbit. The idea is to combine multiple signals and antennas in such a way that certain modulated information depends on the direction from which the signals are received. Such information is coded in the form of signal phases, allowing computing the satellite attitude with one degree of expected accuracy. (A similar approach is used in the VOR - VHF Omnidirectional Range - navigation aid used in aviation, thus the name VORSat.)

The satellite will be travelling along its orbit and transmitting signals in all directions. Knowing the position of the satellite relative to a ground station, by measuring the phase differences of signals transmitted by different antennas on the faces of the satellite and their evolution as the satellite passes by the ground station coverage area, it is possible to compute the satellite attitude from the ground. Three orthogonal rings of antennas are necessary for this purpose, which implies to having 3 individual antennas per face. Other antennas are also required, for GPS (which must be omnidirectional) and for a simple localization beacon.

The transmitted signals are planned for the 2.4 GHz ISM band, using a bandwidth of just 15 KHz. The satellite will be completely solid-state, as the direction dependent signals will be obtained through beam-forming techniques, through a combination of the several antennas. The ground-station requirements are particularly simple: a 2 DOF parabolic dish with a 2.4 GHz feed and LNA, a tunable down-converter to base-band, a sound card and a computer running software to demodulate the signals.

As a secondary goal of the mission, VORSat will attempt to safely re-enter the atmosphere and have its kernel with stored information recovered (trajectory and internal sensor measurements). Re-entry is divided into three sub steps: adjusting friction in the higher atmosphere to adjust expected area of impact (with a goal to land in the Atlantic Ocean), surviving re-entry during the deceleration phase and recovery from the water. In order to guarantee a safe re-entry, the material used to cover the kernel is being analyzed, in order to assure resistance to high temperatures and thermal shock.

Another challenge is to combine antennas with the solar panels, so as to maximize the solar exposure area and energy provided. This development, along with the test of the attitude system in an anechoic chamber and the stability of the re-entry kernel, are being held for the last months.

High-Birefringent Fibre Loop Mirror for Sensor Applications

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The Fibre Loop Mirror (FLM) is a very attractive optical device for use in fibre communications or fiber sensors [1]. The loop mirror is easily obtained by a splice between the output ports of a directional optical coupler. In this case, the two waves travel with identical optical paths in opposite directions and a constructive interference is assured when the waves reenter the coupler. All the light is then reflected back into the input port, with the reflectivity limited only by the losses of the splice, fibre and coupler, while no light is transmitted to the output port. Another type of fibre loop mirror containing a section of highly birefringent (Hi-Bi) fibre present several advantages compared with a more traditional interferometer. One of them is the input polarization independence. Another one is the periodicity of the formed spectral filter, which depends only on the length of the Hi-Bi fibre and not on the total length of the fiber loop mirror [1]. In this work is presented a Hi-Bi fibre loop mirror sensor using a section of Hi-Bi Photonic Crystal Fibre (PCF).

We have analyzed the sensitivity of a fiber loop mirror sensor with an 18.5 cm section of Hi-Bi PCF to variations of temperature and applied strain. The filter obtained has a mean wavelength spacing of 6.5 nm which can be easily controlled by varying solely the length of the Hi-Bi fiber. See Figure 1. Investigating the spectral response we obtained different sensitivities for both physical parameters. Being so, we have demonstrated its application as a simple sensor for the simultaneous measurement of temperature and strain.

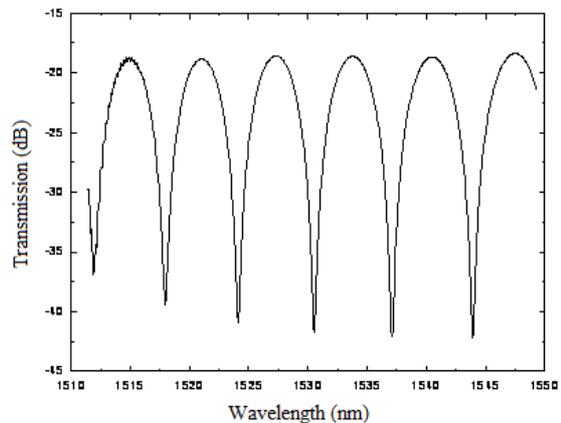


Fig. 3. Spectral response of the FLM sensors.

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Parallel Oral Sessions VI

A4 Geography & Sociology

The creation of the *European Citizen* - the contribution of Portuguese Geography textbooks for the teaching of European Citizenship in the last two decades

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This paper aims to present some of the results we have reached with our research thesis [1]. In it, we tried to analyze how the issue of Europe was "taught" by the Portuguese school textbooks of Geography in the last two decades, significantly.

This was thus a study where we wanted to know how the discipline of Geography has contributed to the creation of an "European Citizen" which is an ultimate goal in a broader framework of Education for Citizenship. Moreover, we set also the assumption that only a serious commitment to a so-called "European Education" will enable the creation of citizens in the future to defend the "European cause" [2].

Having analyzed the different textbooks (10), of 2nd, 3rd. Cycles of Basic and Secondary Education and their programs, we have structured our analysis in 8 points of reflection, whose treatment in the analyzed textbooks is shown in the following figure [3]:

	The problematic of the European limits and the dual vision of Europe-EU	Integration/ Constitution/ Process of the European Union	European Organisms	Advantages and Disadvantages of the Portuguese insertion in the European Union	Variable Geometry Europe	Problems, Dangers and Challenges of European integration	Political Organization of Europe – Geopolitical position of Europe in the world context	The exercise of European Citizenship – the European Values
M1								
M3								
M2								
M4								
M5								
M7								
M8								
M9								
M10								
M6								

Legend:

Very Good	M1	Decade of 1980
Good	M3	
Sufficient	M2	Decade of 1990
Insufficient	M4	
	M5	
	M7	
	M8	Between 2000 and 2008
	M9	
	M10	
	M6	

Table 1 – Synoptic table of the treatment of the various topics discussed in analyzed textbooks.

From its analysis we can conclude that the issues of "European Citizenship" and "European Values" have gained increasing importance in the Geography textbooks.

"European Values" have gained increasing importance in the Geography textbooks.

Thus, our aim is to explore how this "Teaching of Citizenship" has been made in these textbooks, and articulate this analysis (and the need of education) with images less positive than those same textbooks associate with the European Union, such as budget cuts and layoffs.

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- [3] Martinha, C. (2009), "Europe's Mirror – Some notes about Europe Images transmitted by Portuguese Geography Textbooks (1980-2006)" in *10th International Conference on Textbooks and Educational Media - Local, National and Transnational Identities in Textbooks and Educational Media*, Santiago de Compostela, International Association for Research on Textbooks and Educational Media.

Higher Education in Brazil: the ProUni and the challenges for equity

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In the year of 2006, Brazil was indicated by Human Development Report (HDR), published by the United Nations (UN), as the 10^o most unequal country of the world [1]. The possibility of changing this situation depends on governmental initiatives and a wide investment in public policy. The proposal announced in the country, directed to higher education, is noted in the flexibility of admission ways and the creation of public policies that intend to ensure the right of access to minorities, in special, through reservation of vacancies to black and indigenous people and the creation of Programa Universidade para Todos (University for Everyone Program – ProUni) [2]. The impact occasioned by the implementation of this program, which works through the concession of scholarships to low income people, will be analyzed in this paper.

For data gathering, the author made use of: bibliographical data; higher education institutions websites; search in the databases of Ministry of Education (MEC/ProUni), National Institute of Studies and Educational Researches Anísio Teixeira (INEP) and Brazilian Institute of Geography and Statistics (IBGE).

The results of the research demonstrated that, since the creation of ProUni, about 600 thousands students were benefited, and 70% of them are integral scholarship holders. Until the second semester of 2009, 313 036 men and 282 672 women were attended. Also, 3 954 handicapped people and 7 054 teachers from public basic schools had been yet benefited. In respect to learning modalities, 535 735 of scholarship holders are registered in regular courses and 60 257 in “learning by distance” courses [3].

One may say that the reduction in inequalities through the learning system is a long and complex process which must be anchored in a systemic view of education. Under this focus, the more meagre the access ways to higher education, the highest the probabilities of exclusion of those who have disadvantages in competition. ProUni comes to act as a compensatory mechanism with the objective of fixing injustices. This public policy, based on social questions, implies the redistribution of resources and the fighting of the access barriers to this level of learning.

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The central status of the domestic space in the construction of everyday life – the case of «Ilhas» at Oporto

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At first sight the house might be perceived by its economic value. Although, for the agents that everyday live in that place, their home is more... than that. It is the place where their family, expectations and relations with the space outside of their home and even with the city, are built. From a sociological perspective, the conceptualization of the meanings individuals attribute the physical space of the house can be considered an important vector of analysis which allows us to understand the full length of dimensions that structure the life of the social agents. So, in that sense, when we propose to analyze the central status of the domestic space in the construction of everyday life, we are also analyzing other important spheres of the social life such as the work, family and cultural practices.

As has been previously stated, the house can be intuitively analyzed by its economic value. That is an important analysis dimension; as mainly one of the prime goals of Sociology is to understand the interconnections between the places the agents occupy in the social structure and how that place is incorporated by the agents in the organization of everyday life. But the economic value of the house is also a very important dimension; especially when we try to study the access of the agents to goods. That economic value restricts the place where an agent may live in the city, but also for instance, if they will *buy* or *rent* a place. Particularly in the case of Oporto in the 19th century, the low wages of the working classes and the scarcity of places to live originated a very particular form of housing – the so called «ilhas» [*isles*].

We believe that the analysis of the specific morphology and genesis of the construction of this form of housing nowadays is a stated important tool of understanding all the dimensions that have been previously mentioned. But if we want to escape from the traditional perspectives about inhabitation problems, centered in the economic disadvantaged condition of the agents; we must build bridges with other disciplines that focus on related social studies such as anthropology or social psychology. Their own perspectives and methods intertwined with the sociological housing perspective, its centrality and how it is a distinctive and dominative axis among the agents; allow us to narrow the perspective of how the agents represent their everyday life and the way they relate to other people and the space around them. Even more than that, it allows us to make a sketch of how the agents relate to the city itself and to other social groups. Although, this exercise requires a constant work of reflection about the boundaries in our approach and more important of all, how these ideas can be translated to accurate tools of research which can really make us understand the lifestyles of the agents. Our discussion will focus on a reflection between theory and practice, and how we should turn this theoretical approach into a construction of a *case study* throughout a methodological integration of both the theory and the empirical data.

Second-home in Espinho

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Introduction

Inserted in the subject of “Housing Theories and Policies”, this paper’s main objective is to study the second-home in Espinho. The choice of the theme for this paper was due to the fact that we pretend to enrich the acquired knowledge in subjects like Tourism Geography, Land-use Planning, Population Geography, amongst others. The intersection between these forms of Geography has risen because in this science all matters are intertwined and add to one another. second-home, land-use planning and tourism are not exceptions. Our first aim was to contextualize the reader in relation to the evolution of housing policies in Portugal, following a time temporal logic. Then we analysed the second-home in south Europe and in Portugal to finally realize what is the importance of this type of housing occupancy in Espinho

Methodology

The goal is to analyse the second-home and the profile and motivation of those who seek Espinho for buying or renting this type of residence. Due to the unfeasibility of making inquiries during the winter time, our methodology consisted mainly on the analysis of the statistic data available at the National Institute of Statistics, which has allowed us to characterize the secondary housing in this municipality.

Results obtained

The analysis showed that this type of housing occupancy has been growing in the Portuguese territory, which has the second biggest second-homes density in Europe. Throughout this work, we noticed that many authors treat second-home as a driver of tourism and economic development of regions and countries as a whole. However, such development does not come without a price. The main negative effects of second-home can be mainly attributed to the temporary and seasonal character of this type of housing occupancy, as well as to the pressure placed on local resources during well defined periods of the year. Even though the number of lodgings in second-homes has been rising in all the parishes of the municipality, this rise has been more notorious in the parish of Espinho.

Conclusions

In a spatial perspective, second-home is an important component in land use planning. The second-home has an influence in the travel patterns between the usual place of residence and that of the second residence, thus increasing the number of travel journeys at weekends or on holiday periods. The occupants of this type housing live, by definition, in two distinct places, using Espinho as a place of leisure, free time and consumption.

Scenarios of urban sprawl using GIS and cellular automata

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This paper is aimed at the discussion of the urban sprawl model that will be tested in our master's thesis on GIS and Spatial Planning, and draw the scientific community's attention to this area of research, which is very important for spatial planning but still rather incipient in Portugal.

The urban sprawl model we are going to test is based on cellular automata whose potential applications, from the point of view of spatial planning, have to do with their use in simulations of urban growth at local and regional levels(1). These simulations are of great interest to professionals in regional and urban planning as they are powerful tools to support decision-making.

As an extension of the GIS, the model of cellular automata requires dynamic in the data structure and it is becoming increasingly common in the evaluation of urban growth. On the whole, it is a structure of distinct cells, whose values change over time according to rules that also consider the neighbouring effects(2).

However, the variety of existing models has created an additional difficulty which is reflected in the assessment of a model that is best suited to the area under study, particularly when it comes to a space of moderate but rapidly growing occupation, such as the Arco-Refojos urban axis in Cabeceiras de Basto. The dilemma of choosing the appropriate model is always present, since we have to choose from a wide range of options, and this is the main challenge of this work.

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Strategy for Tourism and Nature Leisure Activities in Valongo Municipality: European Support Programs Framework

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This project consists in the analysis of the feasibility of a Tourism and Nature Leisure Activities Strategy in the municipality of Valongo.

Valongo presents a set of specificities which make it an interesting and fruitful study case. In the former decades, the municipality has suffered from urbanistic pressure due to the process of peri-urbanization of Porto city. Nevertheless, the maintenance of important natural elements granted the integration of *Serras de Valongo* (Valongo's mountains) in the Natura 2000 Network (Valongo's Municipality Site – PTCON0024).

Hence the Municipality undertakes important decision making in Land Planning, a crucial factor in promoting tourism and leisure activities' success and competitiveness, it's fundamental that the Municipality takes the role of defining and implementing the Strategic planning of these activities, through land and local resources preservation and valorization, creating environmental, social and economical outcomes that will contribute for the improvement of the wellbeing and quality of life of the population in general.

The set of natural and cultural elements that interest different sciences is diverse enough to attract a wide public other than only the local population, and it can offer activities that range from scientific tourism to several sport activities.

The Paleozoic Park is a point of interest, where a good amount of Paleozoic elements can be found, turning the area into a huge living lab for Geology and Palaeontology scholars. Remark be made for the numerous geo-monuments like the *Riple Marks*, Conglomerates and a set of fossil species (*trilobites*, *ortis*, *ortoceras*). During centuries the extraction of gold, Antimonic and slate, was possible in this territory. This activity has left visible scars in the terrain; however, it is possible to overcome the negative impact by planning leisure and cultural activities that turn these scars into valuable attractions.

The empirical research consists in analyzing the Municipality's role and the role of the several economical agents in promoting leisure and tourism activities through land and local resources preservation and valorization, as well as in its integration in the European Union Support Programs.

The aim of this project is to take part in the effort of finding solutions that are able to set equilibrium between the Land's preservation, the Population's wellbeing and the maximization of resources' efficiency.



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A1 Psychology

Patterns of preschool literacy, numeracy and social skills

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This study is part of a larger project - "Contexts and Transition: Literacy and Numeracy skills", which has begun in 2005 in the Psychology Centre of University of Porto, under the supervision of Isabel Abreu Lima and Teresa Leal. It was developed within a Master's degree and aims to analyze the relationship between the pre-academic skills of literacy and numeracy and the social skills, as well as their importance for academic success, evaluating 81 children aged 4 to 5 years, attending preschool. The instruments used were: a Phonological Awareness Test (Sucena & Castro, 2001), Follow Me, Moon (Clay, 2000), a Letter Knowledge Test - Beginners Level (Castro, Cary, & Gomes, 1998) and Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) (literacy), a verbal counting task, the arithmetic subtest of the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1989) and a number identification task (numeracy) and Classroom Behaviour Inventory – preschool version (Schaefer & Edgerton, 1978) (social skills). The results show a variety of literacy and numeracy skills prior to formal instruction, and, in general, literacy, numeracy and social skills are positive and moderately related. Using cluster analysis, we identified three patterns of results: one group of students with high values in the three groups of skills, a second group with below average results in all areas evaluated and one group of intermediate results, with a higher level of sociability skills. The results sustain that the first group of children is older, and their mothers have a higher level of education.

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- [3] Castro, S. A., Cary, L., & Gomes, I. (1998). Provas de avaliação da leitura – Nível Principiante. (Versão para Investigação). Porto: FPCEUP, Laboratório da fala.
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Language and Meaning Making, a Cognitive-Constructivist Approach

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The writing of this essay was due to a proposal, that arose within *Modelos Cosntrutivistas e Sistémicos* unit, in order to analyse in a psychological critical way- for a term- the novel *Budapeste* [1], according to the cognitive-constructivist model. *Budapeste* is a work of art in which the relationship between the human being and the language and its interferences in the individual psychological dimension, as well as his confrontation with a different symbolic universe. A cognitive-constructivist approach was used; this approach was essential to conceptualize the person as an active organic unit directly linked to co-construction of his own existence.

The main intentions and contributions of this analysis are: (i) the thoughts about the possibility of interpreting the limits of *the constructive meaning making activity* and its implications in the reorganization of one's own experience; (ii) the fact that the *constructive meaning making activity* is a plural extension, which leads to the assumption of the failure of the great totalizing codes; (iii) the deep thoughts on the implications brought about by the turning of *morfodynamics* and *morfogenetics* within semiotics into the devolution on the emotive and phenomenological trait of the psychological subject; (iv) to assume *the meaning making activity* as a defining factor of one's personal identity and, from this point onwards, perceive the viability of adaptation; (v) the sheer representation as the privileged way to get to the core of the ideas in a sense that one can view experience as applied epistemology; (vi) the reflections on the coordination between public and private quality of *meaning making*; (vii) to put in doubt the resistance to change as a mechanism of protection.

The two main drawn conclusions are that the language may be a structuring complex of the self and the meaning making appears to be something external to formalizing, owing to the fact that the social dimension of the individual can't be ignored, at all.

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[1] Buarque, C. (2003). *Budapeste* (8^a ed.). Lisboa: Publicações Dom Quixote.

I am a writer: A program for writing intervention

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As shown by Portuguese Language benchmark tests results[1] Portuguese students struggle with written composition. Writing is not easy. Indeed, it is a complex and demanding task. In 1980, Hayes and Flower[2] have set off a cognitive process view of writing. They depicted it as a problem solving activity and suggested three important components: (a) task environment; (b) writer's long-term memory; and (c) cognitive processes. The latter includes planning (generation and organization of ideas in a writing plan), translating (language production under planning guidance), and reviewing (text improvement through reading and editing). These processes interact with each other, and there is a monitor that decides how, when and what processes are used during writing. Thus, their orchestration demands high levels of self-regulation.

Student's difficulties in writing are assumed to lie on problems in the management of writing behavior. A possible explanation for these problems is that writing instruction is not what it should be[3]. To deal with this, Graham, Harris and colleagues have developed an instruction model (Self-Regulated Strategy Development, SRSD) shown to be highly effective in improving text quality[4]. It has been designed to promote students independence in the use of writing and self-regulation strategies. Based on SRSD, we have developed an intervention program for 5th grade Portuguese children. It focuses in narrative texts and comprises 14 sessions, 90 minutes long, organized in four components: (a) motivation for writing, (b) planning of narrative texts, (c) sentence construction, and (d) revision and consolidation. Our program provides instruction in writing strategies for planning, translating and revising. Additionally, students learn self-regulation strategies (viz., self-instructions, goal setting and self-monitoring) that assist their writing strategies acquisition, use and management.

In this talk we will present an overview of the "I am a writer" program and of its conceptual underpinnings. Portuguese curricula are undergoing a crucial reform, which introduce a process view of writing. The development of a Portuguese evidence-based instruction program, focused in cognitive processes and self-regulation in writing, is an important step to enhance our students writing skills.

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Between psychology and theatre: The common ground of expression and transformation of human emotions

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The paper intends to present the possibilities of exploring commonalities between drama and psychology as specific languages, structures, processes and contents, namely of meaning-making of human experience. The object of such an interface is centred in the emotional dimension of psychological functioning, for which a theoretical perspective was constructed based upon the integration of neuropsychology (*e.g.*, Damásio, (2003) and constructivist recent contributions (*e.g.*, Guidano). In the drama/theater realm emotions are approached from the point of view of the actor and of acting experience, stressing symbolisation processes as modes of transforming them. The ultimate goal is to establish both theoretical and empirical bases for the understanding of psychological change processes as they might occur in drama contexts, including the analysis of drama as an asset for psychological interventions, especially those expressly intended to work energetic, dynamic, affective-emotional aspects of human experience.

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Understanding the inner-experience of anorexia through psychotherapeutic movement

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A six months body-oriented psychotherapeutic intervention project was conducted within a group of seven female hospitalized patients with Anorexia Nervosa (AN) (aged 15-56 years). This intervention worked as a first pilot-study (integrating both dimensions of research and intervention, *ergo*, action-research) integrated in a larger medium-term project, which had, at main goals, collect relevant material on the experiential and semantic levels of the body experience in AN, as well as on the assessment of the movement characteristics/preferences revealed by the patients.

For these purposes, we rely on movement observation during activities of free movement and free interpretation of different music styles, as well as during oriented activities and relaxation exercises, and on the analysis verbalizations which took place in the final part of each session and on the conversation about the feelings aroused by the listen of different music styles and video visualization of dance performance.

This action-research project led to some relevant observations and results which seems to support some theoretical assumptions and allow the interpretation of empirical findings. Specifically, at the movement/body level, we've observed a specific movement pattern including characteristics such as discomfort with touch, rigidly controlled movements and postures, undifferentiated trunks, lack of an internalized sense of the force of their body weight and paradoxical and ambivalent feelings related to sensual movement and femininity. At the patients' experiential and semantic level of body experience, specificities were also found like the clear preference for the use of words that indicates lightness to describe "good bodily sensations";.

Based on this study, an intervention in DMT within anorectic patients is proposed, adapted to the identified needs, which adopts a developmental-constructivist perspective, and it is inscribed in a Psychology of Arts perspective, namely on Nelson Goodman's conceptual proposal regarding the processes psychological worlds construction and structures.

According to the constructivist fundamentals, we can understand that what we read in a symbol and through it vary along with what we bring with us. Not only we discover the world through our symbols as we comprehend and reassess our symbols progressively along with our increasing experience (Goodman, 2006) [1].

In this sense, the DMT intervention that we propose stresses the importance of the mastery of the symbolic system of dance, as a way to permit to the individual to become an autonomous constructor, simultaneously receiving and constructing the aesthetic experience instead of imitating a creative act.

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Self-efficacy in promoting lifelong learning

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Considering the central importance of promoting lifelong learning and taking into account the investment of current policies in this area, research in this domain has increased significantly its pertinence. This project aims to contribute to a deeper understanding of the dimensions and psychological processes involved in the practices of adult education, putting forward ideas that may bring some implications for intervention developed particularly in the processes of recognition, validation and certification of prior learning and Adult Education and Training. The choice of self-efficacy as a central construct is related to the fact that adults participating under the scope of the supply of educational / training programmes promoted by the New Opportunities Initiative reveal that the commitment to learning in formal contexts is rarely the outcome of prior learning recognition and certification. Given that people seek predictability and degree of control over events that affect their lives, and taking into account the rapid and permanent changes in today's societies, with implications in the various dimensions of human life, it seems easy to understand the challenges of adaptation individuals are confronted to. In this sense, perceptions of self-efficacy are seen as extremely important to the understanding of human functioning, being linked to the individual's motivational, emotional and behavioral systems. Therefore, self-efficacy beliefs have an important role on the eventual intrinsic barriers to learning, since they refer to feelings of trust and security in the subject capacities to participate in a particular action, in this case education or training. If the perceptions of self-efficacy play an important role in the choices people make and in the degree of effort and perseverance that they impute to them, these perceptions or beliefs should be considered when we talk about career choices. Based in the conceptual background of the Social Cognitive Career Theory (Lent, Brown, & Hackett, 1994), this study aims to: a) understand the role of the perceived self-efficacy in the construction of meaning made by adults with low levels of schooling in relation to lifelong learning; b) understand whether there are differences in perceptions of self-efficacy, taking into account two different types of education provision / training; c) to evaluate the impact, at the level of sense of self-efficacy, of an intervention in the field of career development with the purpose to foster lifelong career guidance. This project is based in a mix method, with quantitative and qualitative research methodologies, using a quasi-experimental design and a pre-test and post test scheme.

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A2 Literature & Language Sciences

I know It's only poetry, but I like it.

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What's is poetry? This question has been in all literature's history, and in Brazil, had a important and special moment of discussion. Curiously, a dictatorship moment. A moment when the art would refuse all kinds of establishment.

This study will focus on the brazilian literature's historical moment conventionally called "Poesia Marginal". The "marginais" poets brought a strong humor and impact for poetry, but a great subversive power too. Working with the discourse, their poems play with language and the common sense.

Our analysis, will work with some representatives "marginal" brazilians poets like Chacal, Casaco, Leminsk, Wally Salomão, Francisco Alvim and will discuss "what's poetry?" for these poets.

Espelhos de Mulheres: a imagem feminina nas cantigas de escárnio e maldizer de Joan de Guilhade

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During the 12th and 13th centuries women stood at the core of Galician-portuguese poetry, which was clearly influenced by occitanic models. Far from being an exception, Joan de Guilhade's production presents women in different perspectives: they are loved in *cantigas de amor*, they love in *cantigas de amigo* and they are a target of varied commentaries in satirical poetry (*cantigas de escárnio e maldizer*).

Despite some brief references to some *cantigas de amor* and *cantigas de amigo*, this essay is focused on Guilhade's satirical poetry, especially on eight of his fifteen *cantigas de escárnio e maldizer*.

Comparing these eight *cantigas*, we will try to demonstrate that there is a great variety of feminine representations which form a very comprehensive portrait of women's conditions during the 13th century. Besides, we will try to prove that these representations, which tend to be more physical due to the exaggeration of realistic features [1], are mere conventions and should not be taken as individual characters.

[1] Osório, J. A. (1986), “«Cantiga de escárnio» galego-portuguesa: sociologia ou poética?”; ed. ut.: *in Da Cítola ao Prelo*, Granito Editores, Porto, 1998, 5-38.

The Mirror: a philosophical and theological analysis of transcendence and individualization on Guimarães Rosa's short story

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This research intends to analyze the presence of elements from Christian and Buddhist theological thoughts into the short story *The Mirror* (or *O Espelho*, in its original), from the Brazilian author João Guimarães Rosa – namely one of the best authors of the country. The short story, present in the book *First Stories (Primeiras Estórias, 1962)*, is also formally analyzed, showing a connection between its structure and the philosophical apparatus known by the author.

In this short story, a first person narrator tells us what happened to him: in an ordinary day, he saw himself in the mirror as a bestial monster. Horrified, he started a series of “experiments” in order to see what he calls his “vera forma” (“true form”), through methods that are both scientific and superstitious. After many processes, he looks at a mirror for the second time, and surprisingly, he sees nothing. Getting desperate, the narrator asks himself if he may be a “soul-less” man (“um de-almado”, separating the word to emphasize the spiritual part). He spends the next years avoiding mirrors. After this time, we are briefly told he already loved. When he accepts looking at his reflex again, he sees a small light, which slowly takes form as the primal face of a boy. The narrator has then find his true form, and finishes the story by offering the reader a question: would not be this plan an opportunity to finish forming our souls?

We can notice a narrator that allows in his speech the abortion of essayistic features, although one cannot say it loses its identity as a short story once it uses the interruption of an empirical thought (the mainly thought in a scientific essay) to create a shock in the reader. This result of mysticism and scientism therefore generates a double-faced, many times ironical narrator, who never gives the reader the impression that future events can be predicted.

A great influence Rosa suffered can be realized through a spiritualistic perspective. The character/narrator walks through a self-knowledge process with three “stages”, in which the first one (of ignorance or ordinary life) can only take the individuals to a third stage (of absolute wisdom or self-knowledge) after sustaining a point of existential emptiness and apparent failure. This way of spiritual growth similarly appears in both Catholicism and Buddhism. Catholic Theology assures that human soul passes through three Stages of Perfection – Purgative, Illuminative and Unitive; and, at the same time, the Buddhist Ch’an states that between ignorance and knowledge there is the realization that nothing is real, and that everything is nothing.

Guimarães Rosa, just like his most famous character Riobaldo (from the novel *Grande Sertão: Veredas*), “drinks waters from all the rivers”.

Arte da repetição: sobre a possibilidade da reprodução do *stencil graffiti*

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Graffiti is not always regarded as an art form; *stencil graffiti* double so. Even those willing to consider *graffiti* as art, frown upon *stencil* – it's the lack of uniqueness that bothers people.

In fact, the possibility of its reproduction is what makes *stencil graffiti* so interesting. It opens new opportunities of creation and experimentation. The aim of this study is to make some of the artistic possibilities that *stencil* reproduction offers clear.

«The work of art reproduced becomes the work of art designed for reproducibility»[1]: using the conclusions of the german author as a foundation for our thesis, and a few photographic examples taken in the streets of Oporto, we try to show that reproduction is not just a synonym of repetition.

Resorting to examples of canonic literature, this study proves that reproduction serves a handful of purposes: rhetoric emphasis (used, for example, in social protest situations), new interpretations of the same object (using, as canonic examples, works of Sylvia Plath and Carlos Drummond de Andrade) and the creation of a new object altogether (as happens with some of Andy Warhol's works).

As a conclusion, and paraphrasing Gertrude Stein, a rose is a rose is a rose; and so it goes for the *stencil graffiti*.

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A3 Engineering Applications

AllCall : An Automated Call for Paper Information Extractor

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Abstract:

In this work we present AllCall, a project created to help researchers organize their publication schedule. AllCall automatically extracts conference relevant information - conference name, important dates, location, conference website and conference topics - from emails and conveniently presents it on a web interface. To the best of our knowledge, no other application is able to do this sort of information extraction automatically. Nevertheless, there are web pages, such as [1] and [2], which rely on human effort in order to keep the conferences' schedules up to date.

Introduction:

Every researcher receives dozens of Call for Papers (CFP) per day from various sources. We thus propose AllCall, a system which automatically extracts relevant conference information from those emails. AllCall is capable of recognizing whether an email is a CFP, in which case it is able to retrieve the conference name, the conference location, the dates concerning the conference such as the submission deadline, the conference topics and the conference website.

System description:

Our system is divided in three modules, namely the *Email Retriever*, the *Information Filter* and the *Web Interface*. The *Email Retriever* connects to a mail box where the CFPs have been sent to and extracts the email body. These CFPs usually come from existing topic-specific mailing-lists which can be freely subscribed. We filter out emails that are not CFPs by being sensitive to some expressions. Once the email content is in the database the *Information Filter* reads each of the records and extracts the relevant conference information. Again, we attempt to exclude false positives. Furthermore, if the system fails to extract the conference name and/or the dates of the conference, the email is deemed not to be a CFP.

In order to extract the target information we use a series of regular expressions to recognize patterns. Next, the information is organized in a database for easy access.

At last, the *Web Interface* bridges the database and the user, allowing the user to see the conferences organized by several criteria, such as submission deadline, mailing-list, location (e.g. Europe, America) or topic.

Conclusion:

We set out to create a system to help researchers with their daily organization. Currently we have succeeded in extracting relevant conference information with only 8% of false positives. In future work, we want to create a personalized interface to give researchers the possibility to manage their own mailing lists, conference schedules and trip plannings. We want to achieve this by incorporating travel agencies' information and flight information from various sources into our system. Also, we wish to give researchers the possibility to know more about the conference they are submitting to by embodying information about previous conferences and their index.

References:

- [1] - WikiCFP, URL: <http://www.wikicfp.com>
- [2] - AllConferences.com, URL: <http://allconferences.com>

Simulating Urban Computing Applications

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Urban computing represents the insertion of computer technologies in urban environment and urban objects, making their existence pass virtually unnoticed[1]. Nowadays, cities are becoming more digital and interactive, which is a stronger indicator of the urban computing growth.

The aim of the present work, was to simulate an urban computing application in a 3D environment, using the Second Life as our simulator and realize if Second Life is a reliable simulator for this type of applications. So, we created a news service plug-in for the open source social network Elgg accessible by all users. This service sends news to users according to their location on the Second Life and their social relationships. Each user receives around 6 messages from the news service each time he runs the application, 2 local news, 2 random general news (they can be local or not) and 2 news recommended by their friends on the social network. We started by creating 1000 user profiles in the social network and their respective social relationships. We used Second Life client software and the Opensim application as an Second Life server, running in standalone mode. The virtual city in the simulator, was divided in 4 main areas and we created around 8 news for each area and 15 general news. We ran various simulations with different population density on the 4 main areas, and different social network distribution. The point was to verify the impact of our social relationships and our actual location in the news that we receive. Table 1 shows the numbers of news received by users after simulation, according to their location, and the number of users per area. The simulation process is concluded when all users requested 5 times the news service application.

Area	New Town	Old Town	West End	Market
Users	850	50	50	50
Local News	12322	744	748	721
Users	250	250	250	250
Local News	3665	3752	3866	3661

Table 1 - Simulation results

The social impact, was measured by the percentage of news suggested by our friends that corresponds to our actual location, or in other words, the percentage of news suggest by my friends that I might be really interested. As we can see, the simulation results show an increase in the number of news of the location where the number of users increase. We plan to further explore this issue by testing different social network configurations. By using the Second Life, we were able to test these configurations without deploying the application in the real world.

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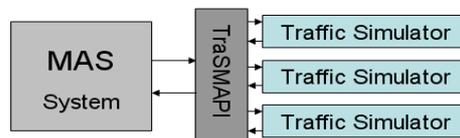
TraSMAPI – An Application Programming Interface (API) for Multi-Agent Systems Real-Time Interaction with Multiple Traffic Simulators

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The road network is the most important infrastructure in terms of communication and flow of people and goods within a city. Therefore, traffic management is naturally an interesting and socially relevant problem to study. However, cities generally use a static approach to traffic management which is not very efficient and leads to the degradation of the life quality of its inhabitants and to the disruption of its business workflow.

Our API is designed to provide real-time interaction with Traffic Simulators (TS). This enables the simulation of dynamic control systems which can adapt to offer the most appropriate, if not the best, solution to different traffic situations.



Most TS were not meant to be controlled in real-time as they were mainly used by civil engineers who were only interested in long term metrics. We created an API which emulates real-time simulation in different TS so that the Multi-Agent System (MAS) can be independent of the simulator being used. MAS have been widely used by the community working on traffic analysis as suggested by Schleiffer in 2002 [1], due to the fact that autonomous agents are a good metaphor to deal with such complex domains.

When designing our API we tried to cover all the realistic system inputs (e.g. change traffic lights state; change the maximum allowed speed of a lane; re-route a vehicle) and information retrieval (number of vehicles passing an induction loop; number of vehicles in a traffic jam; vehicle position and velocity; among others).

With that information and the possibility of real-time changes in the simulation, we can simulate GPS systems which suggest alternative routes considering the traffic information retrieved by the induction loops/cameras; adaptive traffic lights which can communicate with neighbours (MAS) and collaborate in order to improve the traffic flow; introduce accident conditions by stopping one vehicle in one position; simulate vehicle-to-vehicle information exchange which can lead to positive feedback from the system as the information spreads out; and so forth.

These ideas still have to be validated in simulation scenarios before they can be effectively implemented in the real world. Nonetheless, we feel we have developed a powerful and flexible tool to foster further work in dynamic traffic control systems. In fact, we have been using TraSMAPI with the open source traffic simulator SUMO [2] with good results which are not presented here due to the lack of space.

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Modelling and Analysis of a Laryngoscope

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A laryngoscope is a surgical instrument used to facilitate endotracheal intubation task during general anaesthesia or mechanical ventilation.

The laryngoscope is inserted in the throat and its blade force to move downwards in a way that opens the passage. However, due to individual physical characteristics, sometimes this task is very difficult to perform, requiring much training and experience.

The aim of the present study is to estimate the stress on the laryngoscope blade, so that it may be possible to identify and quantify the applied force, improving this way the intubation procedure and diminishing the risk factors of upper-airway damage. This is important because inexperienced intubators tend to generate higher force during intubation than experienced intubators (anaesthetists and residents).

For this study, it was bought a laryngoscope equipped with a Macintosh blade type. This device was carefully measured and then draw as a three solid, using the software SolidWorks®. This draw was then enhanced with the add-in “Photo Works”, making the final result very close to the real device, as it can be seen on Figure 1.



Figure 1 Solid Works 3D draw of the laryngoscope

The blade was simulated using the FEM/FEA software Cosmos (now-a-days called Simulation) which is part of the SolidWorks pack. The model consists of 44697 elements and 75771 nodes, each element with 16 Jacobian points, Fig. 2.

A laryngoscope is usually made of two stainless steel parts: a handle and a interchangeable blade. These parts will be changed to incorporate strain and force sensors to enable the calculation of the mechanical stress in a real situation. A microcontroller with bluetooth wireless capabilities BlueSentry-XPert was already used in preliminar tests.

KEY WORDS

Laryngoscope, FEA, endotracheal intubation²

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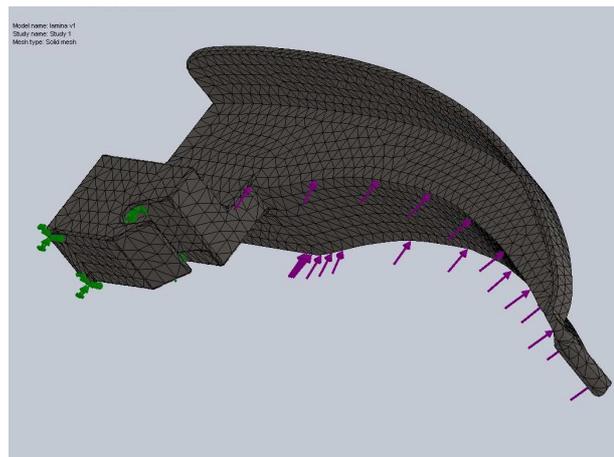


Figure 2 FEA of the laryngoscope blade

Heart Sound Segmentation for Digital Stethoscope Integration

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Digital stethoscopes have been drawing the attention of the biomedical engineering community for some time now, as seen from patent applications and scientific publications. In the future, we expect ‘intelligent stethoscopes’ to assist the clinician in cardiac exam analysis and diagnostic, potentiating functionalities such as the teaching of auscultation, telemedicine, and personalized healthcare.

In this presentation we review the most recent heart sound processing publications, overview the experience of creating a system for collecting remote auscultation data and clinical patient data with a remote hospital. We also relate our personal experience in the implementation and improvement of a technique for heart sound segmentation.

For the analysis of the state-of-the-art on audio processing in cardiology, we have loosely adopted some concepts of clinical systematic reviews.

Regarding the creation of the data collection system, we used technologies that our users were most comfortable with, such as excel workbooks and developed windows software. Special measurements were taken to ensure secure communication between the remote hospital and the data server, located at the university. For the heart segmentation prototype, we implemented state-of-the-art algorithms using MATLAB.

Regarding the survey on the state-of-the-art, we realized that despite the great interest on this research area, some major problems are preventing the adoption of computer-assisted tools on this area. One of the problems identified was the poorly described data and lack of additional clinical information, therefore special care was taken in the development of our data collecting system. Also, it was observed that the implemented algorithm performs poorly in real clinical environments.

Our data collecting system had transferred data from about 32 patients and 96 auscultations. The heart sound segmentation algorithm was developed, and an improved heart cycle identification algorithm proposed by the authors.

Experimental characterization of residual stress fields in T-joints welded by Friction Stir Welding

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The advent of the Friction Stir Welding (FSW) technique allowed a more intense use of aluminum welded structures. Since this is still a relatively new process, there is lack of information concerning its joints mechanical behavior. The knowledge of the residual stress field derived from a manufacturing process is a key factor for the safe operation of structural components; they may be detrimental with a predominant contribution to fatigue and other structural failures [1].

Therefore, the main goal of this work is to characterize the residual stress field in T-joints welded by FSW. The T-joints were composed of two aluminium 6056 sheets in the flanges and an aluminium 7075 sheet in the web. Two residual stress measurement techniques were used: in a first workpiece it was used the Sectioning method [2] while in the second it was used the Hole Drilling method [3].

The results obtained show that the residual stress field along the thermo-mechanically affected and heat affected zones can be modeled by a logarithmic curve. The maximum tensile stresses obtained were in the order of 100 MPa while the compressive ones reached the value of -40 MPa. Both values were obtained in the flanges as the stresses in the web are much lower than these ones. There are no significant differences between the advancing and retreating sides of the work pieces while between the welding (crown) and root ones no conclusions could be effectively made.

This work was carried at the Institute of Mechanical Engineering and Industrial Management (INEGI) under the specifications of the Research Integration Program (BII) promoted by the Foundation for Science and Technology (FCT), Portugal.

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Capacitated Vehicle Routing Problem with Time Windows

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Transportation of goods typically absorbs between one-third and two-thirds of total logistics costs. Its impact on customer service is also notorious, as well as on the environment. Multiple decisions are studied and taken within this area, which go from mode selection and shipment consolidation to vehicle routing. This article focuses on the vehicle routing problem, more specifically on one of its extensions and on the methodologies to obtain good or even optimal results.

The Vehicle Routing Problem (VRP) is a combinatorial optimization problem which concerns the optimal design of routes to be used by a fleet of vehicles to serve a set of costumers. Multiple extensions of this problem are known and one specifically will be addressed - the Capacitated Vehicle Routing Problem with Time Windows (CVRPTW), which can be formally described in the following way:

“m identical vehicles initially located at a depot are to deliver discrete quantities of goods to n customers. Each costumers has a demand for goods and each vehicle has a capacity. A vehicle can make only one tour starting at the depot, visiting a subset of customers, and returning to the depot. Time windows define an interval for each customer within which the visit must be made. (...) The objective is to minimize the distance travelled, and sometimes additionally to reduce the number of vehicles used”. [2]

Some Mathematical Exact Formulations of this problem (Models) were already studied and presented in the literature. The reason why this theme is tackled so often is because it belongs to a set of combinatorial optimization problems which are relatively easy to model but difficult to solve, due to its exponential complexity on the number of customers (n) – NP-hard Problems. In literature, several relaxations, as well as heuristics and meta-heuristics methods were also presented to reduce the complexity while maintaining good (but not optimal) results.

The aim of this one-year-research-period is to evaluate the various forms of solving this problem, using different dedicated softwares for the purpose of getting good solutions. It will also contemplate a case study, where the results will be tested by applying models, generating cutting planes and designing heuristic methods. The case study regards the routes for the collection of solid residuals in a city of Portugal.

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IJUP'10
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Parallel Oral Sessions VIII

A1 Architecture

The epidermal design: From experience to use

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The XXI century contemporary society is now a global village characterized by exponential consumption habits, where the limits of the basic needs are much more diffuse than ever. Products are consumed in an undifferentiated way, transforming the single individual consumer on a general standardized mass consumer. This contemporary thought of an immediate global consumption has improving the sales, the production and the consume on itself. We now live on a world full of fake needs, where products are covered with epidermal skins, being thought much more by the financial and economical point of view, than its structural, functional and physic aspect [1].

It is crucial that the human body and the tool are structurally the same, winning so a dynamic interface and an interdependence of both realities. For that, the objects should not be covered with epidermal skins, with which it intends to provide the illusion of a new and improved product, resulting in inconsistent product displaced and hiding possible weaknesses. It should be necessary to “determine the formal properties of objects”, being this “not only the exteriors characteristics, but most of all, the functional and structural relations. This principle enounced by Tomás Maldonado, reflects the relation that the interior has with the exterior; that form has with function; that reality has with appearance, being the skin “the complex membrane that holds the body together” [2]. Anyhow, it is necessary to have a spine that support and orient any body, that holds a flexible and articulated skin. So a body needs a solid, apparently static skeleton that serve as a measure and as a mold to a flexible, moldable and permeable skin, suffering a constant adaptation and evolution, being always unique and personal.

This happens in nature, where progressively an epidermal reality is built around structured guidelines, as it happens, or at least it should happen in Design and Architecture. On both, the reality appears to be built on a dynamic shape that involves skin and skeleton, developing and evolving constantly. This creates different morphologies derived from each and every single need and use. The concept of skin and skeleton are closely interdependent and one without another are just amorphous forms, failing so to their function. It’s easy to understand that each skeleton support different skins, creating a whole world of different morphologies. At this point is imperative to understand the differences between skin and adornment, being two separated realities with different main functions. Buckminster Fuller, one of the great structural designer ever, says never thought on beauty, knowing that something wrong, when the final solution isn’t beautiful, enhancing so the inner beauty.

Every skin and every structured skeleton are always associated to a “vernacular here and now” that justify and allow the existence of different bodies in different places.

So the designer has a problem: should he think more on a rigid skeleton structure or should the project itself look like the final skin? Should the final form be achieved by the dynamic and performative relationship between user and object or it is better to have a static solution? Should the designer make the difference between “guts designer” and “skin designer” [4] or a hybrid solution is needed?

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Architecture and the Biologic:

The relation between Gender and creation of Space

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The present research, titled as “Architecture and the Biologic: The relation between Gender and creation of Space”, will lead to a dissertation⁶ of the “ Mestrado integrado em Arquitectura”.

The aim of the research is to reflect on the relation between architecture and human body, historically as new. Focusing on the biologic problematic of the gender, i expect to highlight new possibilities, on both theoretical and practical (design) ways.

It should be recalled that human being and architecture are inseparable, buildings are made by man to man, but the way the human body relates to architecture, is something that over time has suffered changes. In the first part of my presentation, i will overview historical matters related with this theme.

The first written which down a direct parallel between human body and architecture was made by Vitruvius, who believing that body was a divine entity, carries human measures to the orders applied in architecture. Since that, and mainly after the XV century, body and architecture has had a changing relation much influenced through technical - scientific advances. Today, more than ever, architecture interacts directly with body, in a relationship that floats between the mathematical simulation 'theoretical', immateriality, Virtual Reality, and the study of materiality 'concrete', inspired in biologic behaviour.

If Biology now inspires scientists and architects through the possibility of creating new bio-materials, there is another biologic factor which influenced and influences the creation of space-gender. If now is less visible, there was times that gender, and the marked differences between men and women, has made real changes on space configuration, especially on dwelling spaces.

Women have for a long time been associated with the private sphere, with an intimate relationship with the house, home and family, so the design and organization of housing is something that over time resulted from his condition.

The second part of my presentation will focus this fact, by reading a critical analysis of architectural projects (well known and of unknown).

As previously mentioned, i expect to highlight new possibilities, on both theoretical and practical (design) ways.

⁶ Supervised by Professor Gonçalo Furtado

The value of memory in project's practice – the importance of ruin in patrimonial interventions

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This reflection has its origin in my graduating thesis, developed on the subject of *Ruin in Souto de Moura's work*. It allowed one to understand the value of memory in architecture's practice alongside the importance of ruin as symbol of time's passage.

Memory represents a crucial function in architecture and ruin, as symbol of the action of time and fugacity of forms, establishes a fundamental relation with it. It is, mainly, this ruin's capacity of representing something superior to itself that ought to be considered, as well as its degradation characteristics, which had an extreme valorisation in Romanticism. This historical period reveals also the essential relation between landscape and ruin, this one considered as a marking element and as a testimony of time's passage - it was believed that those buildings could tell a story. The narrative signification was, therefore, essential. It is even possible to relate this ruin's characteristic of accumulation to the notion of palimpsest, understood as the sedimentation of distinct layers of different times which constitute the territory.

On the other hand, memory's evolution is essential to understand the meaning of monument, especially in what concerns to collective memory. Nowadays, society is marked by the general access to information in a global scale and this information has a instantaneous character, facts that provide a sense of global membership and ownership. This constitutes a most important matter that should be considered in architecture's practice, specifically in what concerns to those interventions in patrimony.

In fact, in the last years, architecture's discussion has been focused on the question of the intervention in patrimony. In fact, this theme represents a very significant number of today's works of architecture and brings one to several issues related to the theme of patrimony and monument. Therefore, it is absolutely essential to understand the importance of ruin and of memory in architecture's practice in order to establish principles to actuate in these circumstances.

Bas-Belleville, A participation experience

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At the present time, local initiatives of production and discussion of public space projects are developed without finding, however, an effective method of including the citizen in the urban project.

The present dissertation develops a reflection on participatory experiments, the collaborative work of the architect, the sociologist and the citizen striving for the acknowledgement of sustained conditions for its practice.

The study of three experimental cases developed in Paris and China allowed to detect situations in which these initiatives might be developed with success and also difficulties to be overcome. Now, we look for succinct, economical and effective ways of communicating with the population for solution of problems in the public space of multicultural residential areas.

In this context, it is relevant the acquisition of a deeper knowledge of reality with the collaboration of the several disciplines in building up a solution.

The analysis of the different methods of study of the space clarified the working frontiers of the two disciplines, Architecture and Sociology, essential in every work of interdisciplinary collaboration. At the same time, practice allowed to experience other means of communication between architect and collective client, namely between those that permit working with a larger number of people.

Nairobi: Upgrading the slums

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Keywords: architecture, sustainability, emergency, underdevelopment, slums, empowerment, Africa.

This work has the urban space of the so-called *underdevelopment countries* as its main scenery. The concepts of underdevelopment, sustainability and emergency will be reviewed in the realm of architecture.

A case study in the context of Mukuru Kwa Njenga - Nairobi, presented as a building project for a library and media lab, in the scope of an international architecture competition was the starting point for a theoretical and practical investigation that tries to reveal how can the architect conciliate the demands and pressures of globalization, with a growth that is sustainable and respectful of cultural values, traditions and local conditions, when intervening in informal settlements in an *underdevelopment* country.

Starting by an interpretation of this premise in the contemporary architecture field of study, the theoretical investigation is centered in the modern movement and the ways of thinking and doing architecture that arose from it, analyzing the social and human responsibility of the architect as an intervenient in the modeling and organization of space. Analysis advances into the dimension and origin of the world's tragedy, drawing a portrait of the present geopolitical situation and analyzing in which way the colonial disaggregation occurred, turning clear the differences between the two worlds, and showing how the gap is deeply rooted both in the urban organization and in the architectural design of cities.

The progress of the theoretical framework about the informal settlements, their formation and organization, that primarily started through a design for Mukuru Kwa Njenga, and the search for answers both of architecture to the human emergencies as of the role of the architect in these contexts, was recovered in a second phase of practical investigation, with the opportunity to travel to Kenya.

The confrontation with the reality of the informal settlements by visiting the slums of Kibera and Kitui Ndogo, in Nairobi, and the cooperation of a group of people from local NGO's and from the Un-HABITAT department in Nairobi, that intervene *ad live* in this reality presented a new perspective to the work which resulted in the development of a new proposal of intervention in the slums of Nairobi. The results of this expedition, once again are presented as a building prototype, no further than a most simplified system of housing assemblage for self-construction, whose design was directly inspired by the observation of existing structures.

This dissertation was supervised by: PHD Arch. Maria Teresa Saraiva da Fonseca Dias da Fonseca



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Parallel Oral Sessions VIII

A2 Civil Engineering, Architecture & Urbanism

Thermal Refurbishment of Roofs in Old Buildings - Assessment of solutions from a technical and economic standpoint

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In current times, the principles of sustainability and of heritage value are basic inseparable concepts in the definition of the principles of urban regeneration for historical centres which are reflected in three key factors: environmental sustainability, economic sustainability and social sustainability.

The aim of this dissertation is to contribute to the body of knowledge in this area through a study of technical and economic assessment of different solutions for the refurbishment of roofs in old buildings of traditional styles, with the aim of improving thermal performance.

The methodology adopted for the technical and economic characterisation of the thermal refurbishment intervention was that defined by current legislation, thus aiming at a precise and legally framed quantification of the energy needs for heating.

On the one hand, the technical study collates and characterises the main thermal refurbishment solutions currently used in Portugal, assessing their pros and cons, taking into account an interpretation of available technical documentation.

On the other hand, the economic study, focussed in three case studies, has the main objective of defining the most adequate solution taking into account specific factors, namely overall cost of intervention, energy savings achieved, pay-back period of the initial investment and thermal losses.

In general terms, the findings indicate that thermal refurbishment solutions at the level of the ceiling (over, under, or in between the structure) are more economical than solutions at the level of the roof, because the thermal insulation area and the volume that requires heating are both inferior.

Solutions based in a continuous application of the thermal insulation material are the most efficient in terms of energy savings, associating both a reduced thickness and smaller weight of the material with the best results in the overall cost of intervention. Furthermore, the use of thermal materials by layers prevents the thermal losses by the junctions and does not necessarily imply a cost increase.

One of the main conclusions of this work is that having a good knowledge of methods of economical analysis – and being able to assess its findings – is a fundamental tool for any technician to make suitable choices for thermal refurbishment solutions.

An analysis of the pay-back period for the initial investment in each case study lead to the conclusion that in most cases the gains achieved with savings in energy consumption surpassed the difference in level of investment between a level of thermal quality in relation to an inferior one. Nonetheless it is still important to assess the impact of thermal losses that occur from the roof by comparison to the rest of the exterior involving as this allows to determine the most adequate thermal quality level for each particular case.

Competitiveness of Portuguese constructors in the national and international market

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The construction sector in Portugal lived periods of great development since the inclusion of the country to the European Union, 1986, and to the end of the 90s. The entrance to the XXI century coincided with a recession period of the construction industry in Portugal, essentially due to the breakdown of internal investment in housing and public constructions.

With the current saturation of the domestic market and before the increasing phenomenon of globalization, many companies of the sector have oriented their strategies to internationalization and diversification of their activities, essential measures to continue increasing the volume of their global production.

In this way, the main objective of this study is to identify the factors that influenced the competitiveness of Portuguese construction companies domestically and internationally. The research process consisted in reading different bibliographic material, where the concepts of competitiveness, globalization and international construction were analyzed. Also, this study used analyses of the macroeconomic situation of Portugal and the construction sector, studies of six national construction companies that have invested in international markets, appealing to questionnaires, interviews and other complementary information.

A model was presented with the intention of identifying such competitiveness factors, and was submitted to a validation process by the participating companies. The construction of this model was based on, essentially, two existing models: Porter's Diamond,^[1] created to analyze of industries in general, and Dupla Estrela,^[2] created specifically to analyze the Brazilian construction industry in international markets. The final model was adapted to the Portuguese reality and established a method of evaluation of the competitive capacity of the selected factors that were boxed in each one of these determining options: Basic factors; Strategy, structure and market competition; Related industries; Demand conditions; Government.

The analysis of the model concludes that there are many existing favorable factors in each one of the determining options, but it also identified other important factors that are unfavorable to the competitiveness of the Portuguese construction companies, making it difficult for them to perform well in the national and international market.

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Operational control of cutting trees with chainsaws in the operation of primeval forest in the Amazon.

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The management of the Occupational Safety and Health(OSH) in the forest exploration is an important subject. It is a dangerous activity and, above all, because the prevention of work accidents in the explored areas demands a specific focus. The particularities related with the work, demand a high planning degree.

As a consequence of the activity of the forest exploration, losses of human lives caused by work accidents and occupational diseases can occur. Both caused, mainly, for the difficulty of control of the work environment [1, 2]. In agreement with the official data, from 1.165.332 work accidents officially registered between 2006 and 2007, 6954 happened in the activity of forest exploration or in areas associated to this economic activity [3].

The effect of the implementation of the Management of a OSH program is evaluated as tool of the global operation on the company planning. The study analyzes the application of the requirement "Operational Control" of OHSAS 18001:2007 on the operation of trees cut down with a chainsawin, in activities of exploration of the Brazilian primitive forest. [4].

It is not possible, through this study, to quantify the gains that the techniques of forest exploration obtain with the deployment of a System of Management of OSH. It is, however, possible to esteem that the number of inherent work accidents in the activity decreases with the application of the proposed requirement. This fact doesn't discard the need of more investigation in this domain. In particular in the sense of the integration of this administration tool with the improvement of the exploration techniques and its relationship with the systems of maintainable forest administration.

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Modernist housing in Oporto: Some works by Januário Godinho

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This work consists of the analysis and reflection on the modernist single-family and multifamily housing in Oporto in the decades of 30 and 40 of the 20th century through some works by the architect Januário Godinho (1910-1990). The study sample covers various types of housing. As an example of “economic houses” a small working-class neighborhood and a set of residential houses will be studied. Three single-family bourgeois residential houses and, as examples of “floor house” (or “floor buildings”), two bifamiliar houses.

The research was based on catalogs, old photographs, academic thesis and on the work’s licensing processes found at the archives of the city of Oporto. Several visits were made to the buildings, with the aim of shooting or studying and confronting them with the other sources.

Far from the capital and the state’s orders, the city of Oporto had the renewal of its architecture done mainly by privates, pulling it away from the monumental architecture that characterizes public works. Since the twenties, several architects developed works with which they outlined individual careers in modernist architecture, including, among others, José Porto, Manoel Marques, Armando Lopes, Rogério de Azevedo, Januário Godinho, Arménio Losa, Viana de Lima and Agostinho Ricca. It’s in this context that housing, as a response to one of the human being’s basic needs, shelter, and the organization of the city become evident as the two major fields of activity of the Modern Movement. Modernist architects, including Januário Godinho, used those housings to experiment with new architectural languages, together with the new concept of life.

Januário Godinho, formed between 1925 and 1930 in the Preparatory Course to Architecture of the School of Fine Arts of Oporto, received a bachelor of Architecture from the same school in 1941 with the rank of 20. He was the author of numerous private and public works. In the decades of 30 and 40 he did a set of houses to the city of Oporto.

The architectural work left by Januário Godinho in this city reveals the taste of the bourgeoisie, the conciliation between habitat conditions and economic resources of the costumers, the understanding given to the hierarchy and functions of the different spaces, the importance attached to hygienistic issues (which in almost every analysed works overlap issues of beautification), and how he responded to the deployment of housing (house and gardens) in the urban network. It also highlights the formal and expressive exploration of geometries, interiors and housing typologies common at the time. His work reveals how Januário Godinho saw, understood and conveyed the architecture of his time.

Influence of Socioeconomic status on indoor thermal comfort: Case Study in Bairro da Bouça, Porto, Portugal.

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Introduction

The impact of indoor thermal comfort on health and well being has been receiving increased attention in recent years. Thermal comfort is defined as "*the area bounded by thermal limits in which most people express feeling good*" [1]. Buildings architecture and buildings envelope physical properties are important factors as potential modifiers of the direct effects of climate variables. However, the residents' socioeconomic background, namely the different ability to change their indoor environment, plays also an important role on the thermal comfort conditions. The aim of this work is to evaluate the influence of socioeconomic background on dwellings thermal comfort in Bairro da Bouça neighborhood. Socioeconomic status of residents is very diverse, as result of a project initially driven by a neighborhood association, and concluded with the cooperative support. Bairro da Bouça (Porto, Portugal) can be seen as a unique case study as it associates different socio-economic conditions in dwellings with identical characteristics. We will present the preliminary results of this research that will involve, in the future, the outdoor and indoor temperature and humidity monitorization.

A survey was applied to 450 residents' in 48 dwellings (of a total of 128), inquiring basic socio economic characteristics, dwelling characteristics, thermal comfort perception and health auto perception. All the data were compiled in a GIS (ARCGIS) for statistical and spatial analysis purpose.

The results shows that 73% of households with good living conditions correspond to a high socioeconomic level and that there is no dwellings with low living conditions corresponding to high socioeconomic status. The results confirm that housing conditions and indoor thermal comfort have a strong relationship with resident's socioeconomic background.

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Parallel Oral Sessions VIII

A3 Arts

The 'art' of entrepreneurship: the tale of the creativity cluster of Miguel Bombarda Street

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Culture and art are emerging as the principal components of the creative industries raising their attractiveness in urban centers. Economics apparently does not have a direct connection with culture and art. However, a closer look into the reality shows that economics and arts are intrinsically related with arts benefiting from a more entrepreneurial and economic led perspectives.

The proposed study details the intimate connection which is established between arts and economics by empirically analyzing the vibrant creativity cluster of Miguel Bombarda Street (MBS), situated at the centre of Porto city. This insightful and informative case further provides a pertinent account on the role of entrepreneurship in arts. Through a combination of in depth interviews to key actors and a comprehensive survey to all the firms and art galleries of MBS, the study highlights and details the emergence of MBS cluster and the reasons and players responsible for such emergence and development. Finally, based on the results we evaluate and discuss MBS cluster sustainability and how this type of projects might contribute for the renewal and boost the Porto city.

Oporto, World Heritage – The Classification and the Intervention

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In the context of the course unit, Project Seminar I, it was developed a research work about **Oporto, World Heritage**, in order to check the main topics, which contributed to achieve this distinctive hallmark. Then, we needed to analyse the measures that had been taken by the responsible organisms, theoretically and technically, in the urban area, after classification. We evaluated not only the importance that the Artistic Heritage had in the accomplishment of the hallmark, but also the proceedings implemented with the purpose of value that Heritage. The leading premise of our project was to try to understand if Oporto was putting at risk the classification given by UNESCO.

The methodology applied divided the work in two different parts: the classification and the intervention. At the beginning of the project, we investigated the quality of the information available on the official sites related with this theme; afterwards, we consulted relevant bibliography and we studied proposals and projects of intervention; at last, we had to go to the fieldwork.

At the first part, we studied the project introduced by CRUARB to UNESCO, in order to Oporto Historic Center be classified. Therefore, we related the Heritage Letters and Conventions with the ideas that supported the candidacy. The point was to apprehend the values claimed as an identity of the building landscape and decisive to the classification. A second aim was to realize which had been the objectives, projects and goals with whom Oporto had committed itself with UNESCO. At the second part, we investigated about the intervention that follows the classification and previous projects that we had already mentioned. We decided to analyse Oporto 2001 enterprise and 2008 Management Report, from SRU- Porto Vivo (Urban Rehabilitation Society). In these projects, we tried to approach the main intervention areas and sectors referred. At last, we studied two examples of the reutilization of a monument, as a benefit to the city and to keep Oporto as a World Heritage: Ferreira Borges Market and the project of Arts' Palace.

After all the investigation, we achieved some conclusions and answers to the question – **Is Oporto, World Heritage hallmark in danger?** -. Once we understood the values that contributed to the classification of Oporto, Historic Center, we noticed the need of renewal projects to the city, in order to maintain those values. As a result, we encountered an among of organisms created with the purpose of serve this aim. We dealt with a huge quantity of miscellaneous projects whose usually haven't been put into effect. Then, it was clear for us the gap between the intervention projects and the fieldwork; the divorce between 2001 Oporto and the Historic Centre; what led us to conclude that the programming was utopian, bearing resemblance with 2008 Management Report. Oporto stills suffering with a century of abandonment and disrepair and it seems it hasn't find a solution, yet. We testified that Oporto lives the threat of become an unequal city. On one hand, a city with attractive and dynamic areas and, on the other hand forbidden areas, where ghettos still dominating.

The maintenance of the hallmark has been sheltered in isolated interventions instead of the integrated value of the classified Historic Centre.

Porto through the game: a playful construction for Casa do Infante

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Using play as a resource so that children interact with the museum, in this case, the Casa do Infante, and experiencing the Porto on another perspective, more affective than geographic. This is the theme of this theoretical-practical master research.

The investigation seeks its justification in fields such as education, museology, cognitive geography, and visual communication. All of this ended in the development of game/toy for the above mentioned Museum destined to children between 6 and 11 years of age.

The object in question promotes a ludic visit, so that children can get to know the museum and at the same time interact with the Porto city through a symbolic construction, divided in three steps. First, the children are taken in a search for answers inside Casa do Infante, for questions contained in cards, like a treasure hunt. For each correct answer, a pillow with the layout of the city is placed in its corresponding coordinate in order to form part of the city map. Then other block-shaped little pillows are embedded over the map, like a big puzzle. The last part corresponds to the assembly of paper monuments that are placed in the map according to their location. (Fig. 1)



Fig. 1: Coloring the monuments

Play appears here as a resource to engage children. Through it they are carried to explore the museum in an unusual way, as they have too an objective. It is a tool to raise their interest in the content of Casa do Infante and at the same time make them feel the city. From their efforts the city of Porto takes life. It is too a way to show children that learning can be fun.

Observing the way children actively participate in building the ludic construction and interact with each other and with the object, we believe that the research has reached its objectives. More than a game of questions and answers, we want it to be an incentive for the acquisition of knowledge and that children realize that they are also responsible for learn.

An applied project around Portuguese Graphic Culture

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The objective of this research is to gather information and evaluate the evolution of Portuguese typography. The first of its kind in Portugal, it will hopefully contribute to a better understanding of the various periods, and may be used by the national and international community of typeface designers, historians and bibliographers.

Based on existing literature, certain difficulties were encountered due to the nonexistence of sufficient systematic studies on typography in Portugal during the 500 years of its printing history. When one speaks of five centuries of typography, there are concrete periods, which are delineated by the stylistic evolution of shapes, which are well defined in the history of art. When analysing the artistic styles, especially in painting there is a clear indication of the existence of new tendencies and variation with European tendencies in regards to graphic designs and creativity.

The execution of a detailed study on the evolution of typography in Portugal is to seek the roots of our cultural heritage and rediscover the art and evolution of the process of creating press types, composition of texts and cultural documents related to this cultural domain.

To understand and study the morphological evolution of letter characters and the graphic composition of the analysed prints while at the same time develop a multi-subject assessment system which includes criteria that is inherent to the actual art, graphic composition, aesthetic standards, typographic technology as well as other elements which transmit the printer's perceptions of his cultural space, thus contributing to the identification of the graphic culture that was part of Portuguese printing. The mere analysis of press types alone is not sufficient. There is a need to incorporate proposed editorial choices. My mission is investigating and recognises the morphology of the different Portuguese typeface, text layout choices, their evolution and consequent a visual communication cultural value.

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Retrato gráfico das minhas viagens

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O diário gráfico, apresenta vários excertos de viagens, cujos cenários são o interior do comboio e o exterior dos mesmos, nomeadamente as estações.

Nestas viagens centrei-me em mim, na minha representação enquanto viajante, sou desta forma a personagem principal.

Ao folhear o diário terão a possibilidade de visualizar, através da minha representação, as posições corporais, faciais, sensações e estado de espírito das pessoas que se servem deste transporte público para se deslocar de uma cidade para a outra.



IJUP^{'10}
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Posters I
Wednesday, February 17th

Social Entrepreneurship: An analysis through youth associations

Filipe A. Ribeiro, Ana N. Veloso, Artur V. Vieira

Entrepreneurship and entrepreneurs are attributed a number of characteristics, the development of which has been considered of top importance by the public authorities in most different countries. Although entrepreneurship, in its more current character - that is, the “commercial” one - is relatively well studied in literature, the social entrepreneurship still lies in an emergent phase, this justifying the existing deficient empiric evidence on this phenomenon. The purpose of this article is to contribute to add evidence to this reality, assessing, by means of a broad enquiry, addressed to the leaders of most Portuguese youth associations, in which way these associations bring an effective contribution for the creation and improvement of skills connected to entrepreneurship. From the obtained data and corresponding results, the conclusion is that youth associations play a determinant part in the development of the enterprising competences of their leaders. Based on a multivariable model, we proved that leaders consider their participation on associativism determining in the formation of their entrepreneur profile. In concrete, we can say that entrepreneurship attitudes are positively and considerably associated to the perception, by associative leaders, of the contribution that associations may bring to the improvement of their knowledge on management of organizations, legal system, performance of the markets. The entrepreneur leaders also recognize that associations increased the respective contact network in terms of business/market, providing them with a number of wider knowledge, and of practical applicability, than any subjects ever taught in their formal academic preparation. In terms of implications of educational politics, the conclusions strengthen the need of getting a larger integration between a formal and non-formal approach for the creation of theoretical and practical skills in the teaching of entrepreneurship on the most different levels. So, the formal recognition of the experience on association management, as a mean of curricular enrichment, would constitute an important improvement in the spirit of the future implementation and adoption of the European Qualification Framework.

Key-words: social entrepreneurship; youth associativism; Portugal

Are the 'entrepreneurs students' entrepreneurs of the future? The contribution of junior enterprises for entrepreneurship

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Few empirical studies have been done on social entrepreneurship, in particular, on the work done by individuals or organizations whose purpose is to provide solutions for social problems. Junior enterprises and students associations created within the higher education system, whose aim is to promote closer relations between academic students and businesses, stand as an example of such organizations. In recent decades the number of junior enterprises within the higher education system has increased significantly. Some argue that they act as true 'incubators' of talent and business, in a relatively small scale, which is adapted to the academic activities of the students involved. Existing literature on social and business entrepreneurship usually emphasizes, respectively, conceptual aspects and the enumeration of the characteristics of an individual with an entrepreneurial profile. Moreover, the literature on students' entrepreneurship targets in particular the role of education and training in entrepreneurship as a way to promote and enhance entrepreneurial attitudes in students.

The present study differs from the existing literature on its aim and scope, providing a complementary approach to the field. In concrete, we analyze, not how to instilling entrepreneurship through formal education or training, but instead, how the participation of students involved on junior enterprises contributes to the development of their potential and enhance, through the practice of action, adequate entrepreneurial characteristics. Thus, our aim is to understand to what extent the work of these organizations impact on students' entrepreneurial competencies, and as such the importance these organizations might have in the (informal) training of future entrepreneurs and CEO's. More specifically, we examine how the participation of students on junior enterprises increase their skills, namely regarding leadership, creativity and innovation, facilitating not only the admission (successful) in the labour market, potentially reflected in the occupation of managerial roles, but also encouraging the creation of new ventures.

To achieve these goals we implemented a direct survey to all former members of Fep Junior Consulting, a junior enterprise at Faculdade de Economia do Porto with 12 years of experience. Based on 44 responses of the 93 former members (response tax: 47,3%) we conclude that the participation in FJC develops entrepreneurship characteristics, with 50% of respondents revealing entrepreneurial characteristics (potential entrepreneurship) and 11,4% of the respondents answering that they had created their own enterprise (effective entrepreneurship).

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Characterisation of wine management on restaurants from the medium and high segments: an integrated approach.

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Despite the recognition of the importance of restaurants to the wine sector, of the harmonization between wine and food and the role of the wine list as a differentiating element of the restaurant, the literature reveals a reduced number of studies on the wine commercialization channel.

Thus, the central objective of the present master's dissertation consists on the characterization of wine management on medium and high segments of restaurants, responding to the following four questions: (i) What is the degree of involvement between restaurants and the wine?; (ii) How do restaurants manage the wine buying process?, (iii) How do restaurants internally manage the wines? and (iv) How do restaurants manage wine sales?

The degree of involvement, measured through the variables associated with the importance given to wine, allows us to characterize the impact of wine on the restaurants outcomes and the importance of the wine experience. A firms wine buyer's process is generally accepted as to be complex and the acquisition of wine by restaurant managers is influenced by specifications of the sector and product. The management of wine in restaurants is not limited to its storage and to table service but to all the actions that have impact on wine sales on the restaurant.

Other parameters such as the person responsible for the acquisition, the selection and evaluation of the suppliers and the management of the wine list must be analyzed. The wine sales in a restaurant are influenced by a diverse number of factors that can promote the wine sales and improve client satisfaction with the restaurant.

Methodologically it was decided to characterize this whole process in an integrated manner. To answer to the investigation questions, we, in collaboration with the magazine "Wine" interviewed restaurants and analyzed the answers to a structured questionnaire based on a sample of 54 Portuguese restaurants.

Some of the conclusions included that: (i) restaurants are highly involved with wine; (ii) wine suppliers present problems that could improve their relationship with restaurants and improve sales; (iii) the restaurants suggestion is the most powerful tool to promote wine sales on restaurants, in the restaurant manager's vision.

Subsequently the results of the present study allowed a better understanding of the restaurant wine management process and also permitted to suggest management actions and strategies regarding wine management.

Development of Strategies to Determine the Best Classification Algorithm Using a Limited Number of Tests

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A given problem can often be solved in different ways, each having certain costs and benefits. Our aim is to develop a strategy that allows us to determine the best classification algorithm for a given problem. The choices are rated with respect to some performance measures (e.g. accuracy). The whole procedure of determining the best option should have low costs.

In this work we exploit previous results on 6 classification algorithms (MLP, J48, etc.) that were run on 40 different datasets. The algorithms were characterized by looking at their global performance. For each dataset, the best algorithm was given rank 1, the second best rank 2 and so on. Afterwards, we have calculated the *mean rank* for each algorithm (see **Fig. 1**).

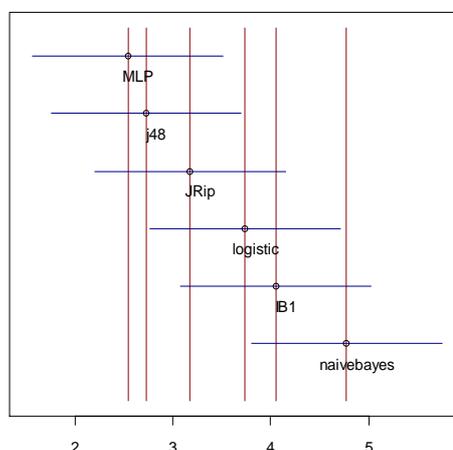


Fig. 1

In this work we explore Bonferroni-Dunn test [1], which is an appropriate statistical test when multiple algorithms are being compared on different datasets. The horizontal blue line shows a critical distance (CD) for $p=0.1$. This scenario enables us to choose the algorithm that was the best one in the past - it is the one with the best rank (in **Fig.1** it is MLP). Obviously it has a good chance to be the right choice also for the new problem. Then we need to determine which algorithm is the best competitor so that we could run a test. The best competing algorithm is chosen using two different criteria: first its mean rank and second the probability that this algorithm beats the best competitor. Both values are estimated by analysing historical data.

In the presentation we describe how this method is continued and also how the method terminates. Our expectations are that the number of all possible tests that need to be carried out can be reduced to relatively small proportion of all total tests. We expect to have some results on this at the time of presentation.

Acknowledgements: I wish to express my gratitude to Prof. P. Brazdil and Dr. Rui Leite (LIAAD / FEP) for suggesting this problem and for their suggestion how to develop this work.

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Proximity Analysis among Researchers at UP and some Institutions using Bibliographic Databases

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Before starting an investigation in particular, the researcher often might want to know which other researchers share the same thematic concerns. Large research institutions, like UP, face the problem that searching and finding people with similar interests can be a complex task.

The objective of this work is to automate the construction of a proximity matrix among researchers from UP and INESC Porto research unit. The matrix can be simply transformed into a graph representation. In the first phase, when our concern was to develop a working prototype, we have focused on a few researchers from LIAAD-INESC Porto only. This phase was completed. Some results are shown for illustration below. In the next phase we will extend the set of researchers to other institutions, including the members of some units of INESC Porto and/or some other R&D unit associated with UP (e.g. CRACS). Then we will gradually extend the prototype to more and more institutions and people.

This goal of constructing a proximity matrix is achieved with the help of existing text mining techniques and applying them to the items found in bibliographic databases. The prototype was developed in language R, which includes package “tm” that facilitates this work, as it contains many useful functions that can be exploited. The first task is to collect names from the institution web site (e.g. web site of LIAAD). In the next step we collect the list of publication titles for each person. We can find these, for instance, on bibliographic database of Digital Bibliography & Library Project (DBLP).

After downloading each page relative to the respective researcher, we have to process the *html* files to retrieve the paper titles. The resulting document collection represents our target corpus. Each “document” characterizes a particular researcher. It includes all words that appear in his/her publications and their frequencies. The document collection can be processed by applying stemming, removal of stop words, spaces, punctuation and numbers. The result is called document-term matrix. The lines correspond to individual researchers. In the next step it is possible to calculate a *cosine measure* of proximity / distance for any two lines (researchers). The result can be represented in the form of a matrix showing all proximity figures. An example of a dissimilarity matrix that has been obtained with our prototype is shown below.

	#1	#2	#3	#4	#5	#6
1 – J. Gama	0	0.573	0.959	0.529	0.538	0.595
2 – P. Brazdil	0.573	0	0.981	0.672	0.705	0.623
3 – A. M. Jorge	0.959	0.981	0	0.98	0.893	1
4 – L. Torgo	0.529	0.672	0.98	0	0.565	0.676
5 – C. Soares	0.538	0.705	0.893	0.565	0	0.816
6 – J. F. Gonçalves	0.595	0.623	1	0.676	0.816	0

For instance, the most related work to J. Gama is the work from L.Torgo (0.529). And the second most related work to J. Gama is the one from C. Soares (0.538).

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Acknowledgements: I wish to express my gratitude to Prof. P. Brazdil (LIAAD / FEP) for suggesting this problem and for his supervision.

Microeconomic Model based on MAS framework: Modeling an Adaptive Producer

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In recent years various methods from the field of artificial intelligence (AI) have begun to be applied to economic problems. The subareas of AI that have turned out to be useful include multiagent systems, machine learning, planning and optimization among others. The area of multiagent systems (MAS) is useful as this framework enables to simulate individuals or companies and various complex interactions among them. Machine learning (ML) is useful, as the behaviour of the agents does not need to be programmed beforehand. The agents have an opportunity to act repeatedly in different settings and learn from this. In game theory this scenario is referred to as a *repeated game*.

Our aims here are similar to those of Wellman et al. [1] that provided the initial stimulus for us to develop this work. We intend to provide some answers to the question raised there, while focusing on a specific domain - the domain of microeconomics.

The experimental study that we have carried out includes an exchange market. Initial conditions are given and the system stabilizes in an equilibrium state. In our model, in addition to the market, the agents can produce, consume and exchange different kinds of goods and services, including agricultural products, clothing, transportation, health, etc. In this respect this work represents an extension of the work in Wellman et al. [1]. To each of these goods we have attributed initial prices that are related to the current world. This has the advantage that we can use common sense to quickly spot errors that may manifest themselves by nonsensical prices. Another novelty in our system is the introduction of the resource *time*. It is assumed that free time is consumed for leisure activities and increases the overall utility. This resource is important when our concern is to model the behaviour of a producer / consumer.

The main focus of the work is how to develop and adaptive producer that would adapt his production to the current circumstances. The model is constructed by generating different states of economy and inserting out trainee agent into this setting. The agent explores different actions and observes their effects. Some of them are classified by the agent as positive, other as negative. Here we exploit function that can characterize states on the basis of observations of some variables. We present our preliminary results obtained with this scenario and discuss their implications.

Acknowledgements

We express our gratitude to Prof. P. Brazdil (LIAAD / FEP) for suggesting this problem to us and providing continued supervision while this work was being developed.

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Awareness and brand equity of “Vinhos Verdes” in Portugal

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The central objectives of this research are (i) study the awareness of the trademarks of *Vinho Verde* in Portugal and (ii) the determinants of the brand equity with major awareness. The brand equity, in this research is measured based on the consumer, discussing the perspectives, constructs and measurement scales.

The brand awareness is considered a fundamental dimension because if a consumer does not know the brand name, it is impossible for him to form any perception of it.

The measurement of brand equity issue has attracted a great deal of attention among academics and business executives.

Of the variables considered in the inquiry, it was decided to review the following model: brand awareness and perceived quality, brand loyalty and brand associations (of which highlights the perceived value), which corresponds to the basic model proposed by Aaker.

The brand awareness of *vinho verde* is evaluated according to the concepts of spontaneous, assisted and global awareness. The wine brand names available with more awareness are the *Muralhas de Monção, Casal Garcia, Deu-la-Deu, Gazela, Quinta da Aveleda e Ponte de Lima*.

The hypotheses developed were tested starting from a sample of 200 consumers of Vinho Verde, from several districts of Portugal. The analysis resulted in the brand value associated with the brand name and is explained by the following variables: loyalty perceived quality and perceived value.

These results highlight the importance of the variables related to the product, with the purchasing behavior and brand associations in the formation and consolidation of the value associated with the brand. We also emphasize the importance of brand and targeted strategies for brand building have on product differentiation, retention and loyalty, that is, to build sustainable competitive advantage.

Quality of pharmacy service: Development of the instrument PHARMPERF

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Today's retail pharmacy environment has been characterized as being highly competitive and constantly changing. Pharmacy managers are continually searching for an advantage that will give them a competitive edge within their respective markets. Pharmaceutical care represents a significant translation in the profession of pharmacy, where the primary focus is the patient outcomes of care rather than the distribution of drug products. In the pharmaceutical care concept, pharmacist must ultimately accept their responsibility not only to dispense drugs but also to identify, correct and prevent drug related problems and collaborate to achieve public health. To be able to undergo the necessary changes to improve the service offered by pharmacies, managers must be able to identify their strengths and weaknesses. This research was undertaken to develop and validate a multidimensional measure of patient's perception of quality of pharmacy service. A self-administrated questionnaire consisting of 45 Likert-type attitudinal items was adopted and named PHARMPERF (Pharmacy Performance). The study was conducted on a convenience sample (n=205) of clients of five pharmacies in northern Portugal. Methods used to construct multi item scales measuring separate dimensions of service quality include both exploratory and confirmatory factor analysis. Dimensions of quality identified were: efficacy and technical aspects, communication, empathy and public health promotion, tangibility, management and financial aspects and accessibility and availability. The new instruments' reliability, validity and explanation capacity were tested and confirmed the measurement capabilities of PHARMPERF. Managerial conclusions were also drawn.

Effect of dimethyldioctadecylammonium bromide on the potentiometric determination of sulfamethoxazole

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Sulfamethoxazole, 4-Amino-N-(5-methyl-3-isoxazolyl)benzenesulfonamide (SMX), is an effective antimicrobial agent in treating infections caused by Streptococcus, Staphylococcus, Salmonella, and Coccidia [1]. It acts as a competitive antagonist of p-aminobenzoic acid (PABA) and thus as an inhibitor of folic acid synthesis, since PABA is an integral component of the structure of folic acid [2]. It is used for human and veterinary purposes and may be found in the aquatic environment as a contaminant.

The determination of SMX may be carried out by means of several analytical techniques, such as potentiometry with PVC-based ion selective electrodes (ISEs). Some important features of the PVC-based membranes, such as the ionophore and the amount/kind of additive used, influence significantly the analytical performance of ISEs. Hence, in this work SMX selective electrodes were prepared with alpha-cyclodextrins (α -CD) and with or without additive dimethyldioctadecylammonium bromide (DDABr).

A Crison[®] μ pH 2002 decimilivoltammeter (± 0.1 mV sensitivity) was used for measuring the potential differences between an Orion 90-02-00 double junction AgCl/Ag reference electrode and the indicating electrode. The selective electrodes had no internal reference solution and used an epoxy-graphite matrix as conductive solid contact [3]. Calibration curves followed the Litre beaker method [4]. All electrodes were placed in a convenient support over a magnetic stirrer and immersed in 50.00 ml of HEPES 0.01 M. Suitable increments of SMX standard solution were added.

ISEs without additive did not display a potentiometric response, but electrodes with 25% of DDABr presented sensitivities of 57 mV/decade, close to those of the Nernst equation. A slight increase in slope was also observed for an increasing amount of additive. Both limit of detection (LOD) and lower limit of linear range (LLR) remained unaffected by the additive amount.

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Trimethoprim molecularly-imprinted polymers for potentiometric sensing units

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Trimethoprim is generally administered in large quantities to humans and animals to treat a variety of diseases and infections. Often, a high percentage of them are excreted from animals without metabolism or in conjugated forms which readily convert back into the parent compounds [1]. A thorough literature search revealed that a number of analytical methods are currently available to detect this antibiotic. Numerous LC methods with UV [2] and fluorescence detectors [3] were reported. Recently, capillary electrophoresis (CE) with fluorescence detector [4] was used.

Ion-selective sensors would be an alternative analytical tool because they offer high precision and rapidity, low cost of analysis, enhanced selectivity and sensitivity over a wide range of concentrations [5]. Ionophore molecules are responsible for the chemical sensing and signal generation in the electrochemical interface of a potentiometric sensor. These could be molecularly-imprinted materials (MIPs) to enable stereochemical recognition of the analyte and enhance the selectivity enhancement of sensor.

This work proposes a new biomimetic sensor material for Trimethoprim. It is prepared by means of radical polymerization, having trimethylolpropane trimethacrylate as cross-linker, benzoyl peroxide as radical initiator, chloroform as porogenic solvent, and methacrylic acid (MAA) and 2-vinyl pyridine as monomers. The later compounds have different chemical functions and acid/base properties: carboxylic acid and aromatic amine functions, respectively, for which different interactions with the analyte are expected. The selectivity and sensitivity of the MIP sensors were evaluated by spectrophotometry. Results showed a higher affinity for MAA MIP particles and the template molecule.

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Determination of ibuprofen in water using solid-phase extraction (SPE) and liquid chromatography (LC)

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The focus of environmental research has recently been extended beyond classical pollutants, such as dioxins, PAHs, PCBs and pesticides, to pharmaceuticals, steroids, hormones and personal care products [1]. Urban or industrial discharges introduce these compounds into the environment. The presence of non-steroidal anti-inflammatory drugs (NSAIDs) in the aquatic environment has raised great concern [2].

Ibuprofen [(+/-) 2-(*p*-isobutylphenil propanoic acid, (CH₃)₂CHCH₂C₆H₄CH₃CHCO₂H] is a well known NSAID, analgesic and antipyretic agent. It is used for relief of symptoms of arthritis, primary dysmenorrhea, fever, and as an analgesic, especially where there is an inflammatory component [3]. Ibuprofen is a *core* medicine on the World Health Organization's "Essential Drugs List", which is a list of minimum medical needs for a basic health care system [4].

However, the analysis of NSAIDs in the environment is a difficult task due to the complexity of the matrices and to their low environmental concentrations. Sensitive and selective analytical procedures based, in general, on long and laborious methodologies, are required for accurate NSAID determination. The literature shows a variety of methods (approved and non-approved by governmental health agencies) such as volumetric analysis, potentiometric titration, liquid chromatography, UV and infrared spectroscopy, and capillary electrophoresis for the analysis of ibuprofen and other NSAIDs.

An analytical method based on high performance liquid chromatography with diode array detection has been developed for the determination of ibuprofen in water samples. Pretreatment of the samples was necessary and was achieved by a SPE procedure.

Acknowledgments:

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Physico-chemical and microbiological characterization of surface waters in the Municipality of Matosinhos

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Over the past few years, the municipality of Matosinhos has been showing major concerns about the resolution of environmental problems, namely those affecting adversely the water quality of streams and, consequently, beaches water quality.

The degradation of surface water quality due to both livestock and industrial effluent discharges and unsuitable agricultural practices has led to a more pronounced need for planning and integrated management of aquatic resources.

In this study, 7 sampling campaigns were conducted and 16 sampling sites were monitored. Nine sites were established at the mouth of streams, four in the rivers Leça and Onda, and the remaining three in discharge collectors. In the campaigns conducted during the summer, some streams were in by-pass mode, in order to keep them from affecting beach water quality, whereas some were droughty, thus having no influence on the quality of water.

Surface water quality parameters were evaluated, such as organic matter content, some inorganic pollutants, nutrients, contamination by metals and fecal contamination.

The results obtained in the physical-chemical and microbiological analyses were treated, analyzed and discussed. An index of water quality (IQ) was then calculated for a simple and immediate comparison of water quality values in the various sampling sites, and over time. It was concluded that the stream of Agudela (AGD) was the one which presented the best water quality index [1].

Sample data evaluation as regards physical, chemical and microbiological parameters were conducted according to Portuguese legislation.

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Evaluation of the suitability of the marine biotic index AMBI to assess disturbance in coastal systems: the case of the Douro estuary

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Macrobenthos are animals that disclose the state of the surrounding environment and present differential sensitivity to disturbance, which portrays in changes in the community space-time composition when the ecosystem is under stress^[1].

This study aimed to test the applicability of a marine biotic index (AMBI) in the assessment of the ecological quality of the water in the Douro estuary, using soft-bottom benthic communities as disturbance indicators.

The Douro river was the site chosen for this project and samples were taken monthly (between October 2008 and April 2009), in the low-tide period using a 120 mm Ø core sampler.

Twelve taxa were identified in the course of the study and the resulting value for the biotic index was 6, which corresponds to a heavily disturbed benthic community. These observations come to terms with what was expected, thus being consistent with other studies performed with other methodologies at this location^[2,3].

In addition, the M-AMBI index was calculated to determine the ecological quality status of the water regarding the context of the Water Framework Directive, but the results obtained were not consistent with the AMBI index as they were compromised by the reduced number of species found and samples performed.

In this way, it is concluded that AMBI index is a useful and suitable tool to assess disturbance in estuarine systems but more studies should evaluate the M-AMBI index results.

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Degradation of caffeine as an emerging water pollutant using CNT/TiO₂ composite materials under near UV-Vis radiation

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The continuous appearance of new pollutants in water courses as a consequence of new standards of living increases the priority of current investigations on waste water treatments, becoming mandatory the continuous development of new clean technologies. Heterogeneous photocatalysis is gaining importance among several oxidizing techniques for wastewater treatment since a complete mineralization of organic pollutants can be achieved at mild conditions of temperature and pressure [1]. TiO₂ is the most used photocatalyst since it is highly photoactive under UV light. However, UV radiation consists merely on 3-6% of the solar spectrum. Therefore, the development of photocatalysts absorbing light in the visible region is a matter of interest on photocatalytic applications. The interest of carbon nanotubes (CNT) in the development of TiO₂ based composites has been explored since these materials can extend the light absorption to the visible region with photocatalytic activity on organic pollutants degradation [2].

In the present work, caffeine was used as probe molecule in photochemical degradation, since this compound is gaining relevance as an emerging pollutant on environmental research [3]. Caffeine has been detected on natural water resources over many different countries and it is the most widely consumed psychoactive substance over the world. The photochemical experiments were conducted in a glass-immersion reactor equipped with a UV-vis Heraeus TQ 150 medium pressure mercury lamp. The reactor was charged with a fixed amount of catalyst (1 g L⁻¹) and with 250 mL of a caffeine solution (50 mg L⁻¹) which was continuously bubbled with a stream of 20 vol.% of oxygen. Samples were withdrawn regularly and centrifuged prior to HPLC and TOC analysis, in order to separate any suspended solids.

Caffeine was not degraded by photolysis. However, under heterogeneous photocatalytic conditions, the molecule was completely degraded after 30 min using the commercial AEROXIDE[®] P25 and after 90 min using a MWCNT/P25 composite synthesized on our laboratory through a hydration/dehydration process. The improvement on the CNT/TiO₂ composites preparation is under study.

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Photochemical degradation of *trans*-resveratrol

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The reduction of water pollution has been the focus of many research activities on the last decades, while the continuous emergence of new pollutants on water courses increases day by day as a consequence of new social habits. Many biologically recalcitrant compounds require chemical treatments such as Advanced Oxidation Processes (AOPs). Heterogeneous photocatalysis has been explored as a cost competitive AOP since it can be operated at ambient temperature and pressure. The process involves the use of a semiconductor metal oxide catalyst, in most cases TiO₂, which under radiation and in the presence of oxygen leads to the formation of strong oxidant species like hydroxyl radicals (HO•) and superoxide radicals (O₂^{•-}) [1].

Resveratrol is an antioxidant stilbenoid compound which medical properties are associated with lowering the risk of coronary heart disease and with anticarcinogenic activity. Resveratrol is found in grape skin and is introduced in the human diet through the ingestion of wine, in which both *trans*- and *cis*- isomers are found [2]. Recently it emerged as a pollutant in wastewater since *trans*-resveratrol is industrially synthesized and consumed for anti aging effects in different personal care products.

In the present work, *trans*-resveratrol was chosen as the probe molecule to be oxidized by photochemical degradation conducted in a glass-immersion photochemical reactor. Two different light sources were tested, a UV Heraeus TNN 15/32 low pressure mercury vapor lamp (emission line at 253.7 nm) and a UV-vis Heraeus TQ 150 medium pressure mercury vapor lamp. The reactor was charged with 20 ppm aqueous solutions of *trans*-resveratrol and bubbled with a stream of oxygen 20 vol.%. Samples were withdrawn regularly for HPLC analysis and TOC assessment. The concentration of *trans*-resveratrol was null after 180 min under UV irradiation but with the UV-vis lamp the pollutant completely disappeared after 60 min. However, no TOC removal was observed for both systems. Observing the chromatograms obtained by HPLC analysis, besides the peak of *trans*-resveratrol ($\lambda_{\max} = 306$ nm), a new peak ($\lambda_{\max} = 285$ nm) appears in the first samples, rapidly becoming more significant on the following samples, while the *trans*-resveratrol peak decreases. With basis on the literature [2], the new peak seems to correspond to *cis*-resveratrol. Thus, the disappearance of *trans*-resveratrol results not from its chemical degradation but due to *trans*- to *cis*-isomerization, explaining the TOC results. New experiments are being conducted with a commercial AEROXIDE[®] P25 catalyst and a titanium dioxide prepared on our laboratory by a modified acid catalysed sol-gel method.

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Degradation of the antibiotic Amoxicillin by Fenton's reagent oxidation

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Many compounds are responsible for environmental contamination, in which antibiotics play an important role. They are produced in a large scale due to the fact of being consumed in great amounts in both human and veterinary medicine. About 80 – 90% of the amoxicillin, one of the most prescribed antibiotics in Europe and USA, is excreted in a non-altered form. However, no legal limits are nowadays established for the amount of antibiotics in environmental water. Thus, a great concern arises about their removal. In fact, small concentrations of the antibiotic in the environment can cause the development of resistant bacteria.

In order to fight against this problem, a study was developed to come up with the ideal conditions for maximum degradation of amoxicillin, by Fenton's reagent oxidation. This advanced oxidation process is based on the generation of highly oxidative hydroxyl radicals (HO•) by cleavage of the oxidant molecule (hydrogen peroxide – H₂O₂), which is carried out in acidic medium by action of ferrous ion (Fe²⁺) catalyst.

The Fenton's reagent oxidation was done in a batch reactor with temperature control, where an amoxicillin aqueous solution was added, with a concentration of 550 µg/L. The conditions studied were the H₂O₂/amoxicillin molar ratio, pH and temperature. Samples of 2 mL were removed from the reactor at specific time intervals to bottles with sodium sulfite (to stop the reaction by consuming residual hydrogen peroxide, SO₃⁻ + H₂O₂ → H₂O + SO₄⁻). The concentration of the antibiotic in these samples was then quantified using the HPLC method with DAD detection.

It was found that, in the ranges tested, the best conditions were a H₂O₂/amoxicillin molar ratio of 26.8 (scavenging effect was noticed at higher ratios), a pH of 3.5 (in agreement with other studies reported in the literature [1]) and a temperature of 40 °C (Arrhenius dependence of the kinetic constants). The use of such conditions allowed the complete removal of the antibiotic in only 45 minutes of reaction in a batch reactor (within the uncertainty associated with the analytical technique), thus proving the effectiveness of this advanced oxidation process.

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Degradation of Metalaxyl by Chemical and Biological Routes

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The photocatalytic treatment of pollutants has shown a huge potential in environmental protection, in particular for the treatment of water-soluble pesticides with limited biodegradability [1]. In this work, the efficiency of the photo-Fenton process was investigated under different operating conditions. In this process $\bullet\text{OH}$ radicals are formed homogeneously from a mixture of iron (Fe^{2+}) salts and hydrogen peroxide (H_2O_2) in the presence of light. An actual persistent pesticide, mainly consisting of metalaxyl, was selected as model pollutant. The experiments were performed in a batch photoreactor with a UV-vis lamp as light source and a glass jacket which cuts-off UVB and UVC lights, with the aim to investigate the process efficiency under visible radiation. In a typical run, the pH of a metalaxyl solution (151 mg/L) was adjusted to 2.8 and different concentrations of H_2O_2 were studied. Samples periodically withdrawn were analyzed by HPLC and TOC. Among the results obtained, Figure 1 shows that metalaxyl is poorly degraded by direct photolysis. However, when H_2O_2 is added to the reaction a pronounced increase in the degradation rate of metalaxyl is observed. The integration of the solar-driven engineering approach with a biological route is currently being studied in order to analyze the effect of intermediates formed from the chemical process on *Solanum nigrum* plants and to evaluate the efficiency of the designed integrated methodology.

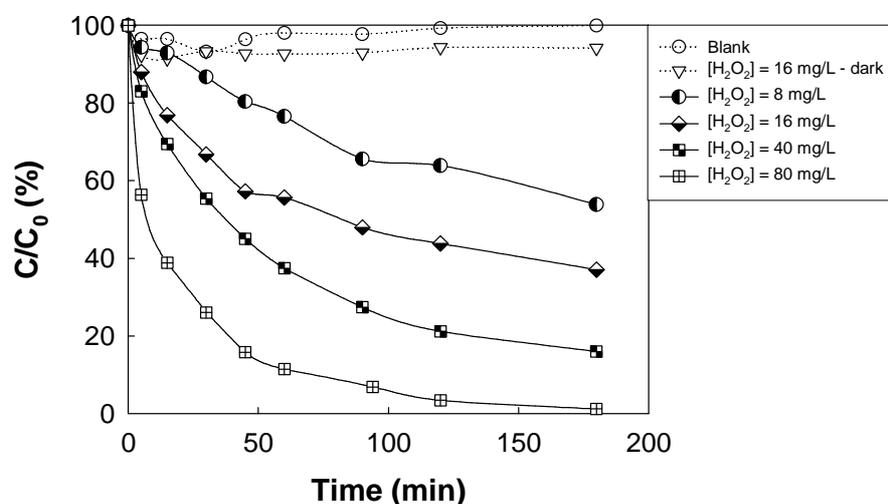


Figure 1. Degradation vs. time decay curves of metalaxyl during the photo-Fenton experiments using different H_2O_2 contents and 2 mg/L of Fe^{2+} . Blank: $[\text{Fe}^{2+}] = 0$ mg/L; $[\text{H}_2\text{O}_2] = 0$ mg/L.

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Determination of endocrine-disrupting compounds in water by gas chromatography with mass spectrometric detection

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Chemical compounds such as bisphenol-A (BPA), estrone (E1), 17 β -estradiol (E2) and 17 β -ethinylestradiol (EE2) are classified as “endocrine-disrupting compounds” (EDCs), that were defined by the European Commission as “exogenous substances that cause adverse health effects in an intact organism, or its progeny, consequent to changes in endocrine function”^[1]. The natural estrogens such as E1 and E2 are mainly derived from excreta of humans and livestock. EE2 is a synthetic steroid and is the most common used as contraceptive and in hormonal therapies. Environmental waters contamination is due to large volumes of municipal, agricultural and industrial wastewater discharges. Apart from these steroids, BPA have been mainly used for the production of epoxy resins and polycarbonates and it is also considered a compound with estrogenic activity, with impact in environment and an incipient of concern in bottled waters^[2].

The main objective of this work was to implement and validate a sensitive and selective methodology to detect and quantify 4 EDCs, simultaneously, in environmental water samples and bottled waters (analysis of BPA) using solid-phase extraction (SPE) and Gas Chromatography tandem Mass Spectrometry (GC-MS), after derivatization with silylation agent N-methyl-N-(trimethylsilyl)trifluoroacetamide (MSTFA)^[2]. The GC-MS determinations were performed in parallel on a Thermo Polaris Q with an ion trap mass spectrophotometer and a temperature-programmable injector (PTV) and on a Shimadzu GCMS-QP2010 Plus with a single quadrupole mass spectrophotometer in injection splitless mode. Linear calibration curves were obtained to the EDCs for concentrations ranging from 50 to 500 $\mu\text{g.L}^{-1}$.

The SPE optimization was done using different cartridges such as Grace Pure Fast, Grace Pure Low, StrataTM-X, StrataTM SDB-L, LiChrolut[®] RP-18 and LiChrolut[®] EN/RP-18. All analytical calibration curves, from direct injection of standard mixtures showed a coefficient correlation level (R) higher than 0.996. Instrumental quantification limits for BPA, E1, E2 and EE2 were 54.4, 42.6, 50.1 and 91.9 $\mu\text{g.L}^{-1}$ for Thermo Polaris Q and 62.8, 117.6, 180.0 and 68.0 $\mu\text{g.L}^{-1}$ for Shimadzu GCMS-QP2010 Plus, respectively. SPE methodology shows recovery above 90% for all cartridges tested. The results suggest that with a single step of sample preparation it is possible to achieve good recoveries for these four EDCs, allowing the analysis of different water matrices.

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Characterization of the actual state of oil contamination in a beach affected by the Prestige oil spill – the *O Rostro* beach

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Oil spills can become a serious environmental problem as they affect sensitive marine areas and may be implicated in producing changes on natural ecological development. Furthermore, they also have negative effects on local economic activities, constituting a challenge for strategic contingency management. Studies from the *Prestige* oil spill, that occurred on the 13th November of 2002 and which seriously affected the “Costa da Morte” (Galicia, NW Spain), indicated that subsurface oil can reach depths well beyond the estimations currently used in cleanup strategies and that methodological approaches for the evaluation and monitoring of “deep buried” subsurface oil are needed. As a result, this work was focus in a case study carried out in the intertidal section of the “O Rostro” beach, located within the inner area of Lires Ría (Galicia, NW Coast of Spain), an area affected by the *Prestige* oil spill.

The main experimental objective was to have a preliminary characterization of the actual state of subsurface oil contamination of this beach. For that, two cores (\approx 2m depth) were collected in the selected beach. Total petroleum hydrocarbons contents were determined in diverse sediment samples of the cores (in selected depths) by Fourier Transform Infrared Spectroscopy (FTIR) after their extraction by sonication.

Obtained results indicated that oil was still present at different depths in the “O Rostro” beach. In addition, results indicated that a significant amount of the detected hydrocarbons were volatile and that they were not homogeneously distributed within the sediment.

These hydrocarbon results are only initial indicators of oil being present in the selected beach. The actual state of contamination will be accessed by analyzing selected hydrocarbons (namely aliphatic hydrocarbons and PAHs) in other cores collected specifically for that purpose.

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Characterization of the actual state of oil contamination in a beach affected by the Prestige oil spill – Nemiña beach

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Bearing in mind the extension and magnitude of its environmental impact, the Prestige oil spill (2002) is already considered one of the most widespread oil disasters in recent history. A year later, the fuel had contaminated about 2500 km of shoreline. Since then, several studies were conducted to monitor the state of contaminations of the sites affected by the spill. These studies permitted the understanding that the current protocols of cleaning up an oil spill are not as effective as it was once thought because they proven that the oil can reach higher depths than those normally considered.

The purpose of this work was the characterization of the actual state of oil contamination in a beach affected by the Prestige oil spill: the Nemiña beach, in Costa da Morte (Galicia, N.W. Spain). This was preliminary made by analysing the total petroleum hydrocarbons (TPH) contents in different depth of two collected cores (~2m depth). Analyses of TPH were carried out by FT/IR measurements after hydrocarbon extraction from the sediment.

Initially, in this work, the focus was the optimization of parameters to allow the quantification of TPH in the sediments of Nemiña beach. To achieve this several external calibrations with hexadecane and *iso*-octane standard solutions were carried out and tests were made using reference material, blanks and spiked samples.

The use of hexadecane and *iso*-octane as standard solutions permitted the determination of the mean limit of detection (LOD) as 23 $\mu\text{g/g}_{\text{sediment}}$ for the overall methodology. The tests using reference material were satisfactory and had an average percentage recovery of 97% (RSD of 7%). Results from spiked blank and sample solutions indicated that using the present analytical methodology samples quantification was made by excess, which must be taken in consideration when analysing samples results.

The optimized methodology was applied to sediment samples from the Nemiña beach, In the TPH quantifications, concentrations were all below LOD in all sediment depths studied, both in dried and wet samples.

So, the Nemiña beach is apparently clean.

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Contribution of the Microbial Community for the Degradation of the Prestige Buried Fuel in Intertidal Beach Zones

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In November 2002, the sinking of the Prestige oil tanker off the Galician coast (N.W. Spain) caused a major ecological catastrophe affecting the ‘Costa da Morte’ coastal zone (N.W. Spain). Several years after the disaster, fuel remains embedded deep in the sediments, sometimes well below the groundwater level. The remobilization of this “deep buried” subsurface oil, which occurs periodically and is highly related to beach morphodynamic, can compromise the recreational use of beaches. This study was carried out in two sandy beaches (Nemiña and O Rostro) directly affected by the oil spill. Sediment cores with 2 m depth were extracted in the intertidal area and sectioned in 10 cm layers for microbial and hydrocarbon characterization. In order to estimate microbial abundance, total cell counts were enumerated by DAPI and culturable hydrocarbon degraders were determined using a modified most probable number protocol. Hydrocarbon contamination was visually detected at O Rostro beach, between 0.5 m and 2 m depth. Despite the presence of buried fuel, DAPI counts were similar along the vertical gradient. However, the abundance of hydrocarbon degrader microorganisms in the deeper layers increased with increasing contaminations levels. These results points to the need to develop bioremediation strategies as a clean-up tool for buried fuel in intertidal zone of sandy beaches affected by oil spills.

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Evaluation of the influence of different factors on remediation of aged contaminated soils by petroleum hydrocarbons - a pilot study

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Soil contamination by petroleum has been attracting considerable public attention over the past decades, because the presence of petroleum hydrocarbons (PHC) in soils is an adverse factor for human health and a negative impetus for plant growth and development. With the expanding of the soil contamination petroleum hydrocarbons, remedy, treat and control this contamination is becoming a technical problem in the environmental protection.

Aged contaminated soils by PHC present generally enrichment in non-volatile fractions. Furthermore, some PHC can be tightly adsorbed into the soil particles, decreasing their bioavailability and microbial degradation.

Bioremediation and/or plant assisted bioremediation (rhizodegradation) have been increasingly considered valuable alternatives to chemical and physical treatments, because they are non-destructive techniques that rehabilitate soil structure being, at the same time, cost-effective.

At *Refinaria do Porto* is presently in progress a pilot project (financed by *Petróleos de Portugal- Petrogal S.A.*), carried out *ex-situ*, on “Investigation of the most suitable conditions for bioremediation/rhizodegradation of petrol hydrocarbons”. Effects of multiple factors, like: (a) bioaugmentation, (b) addition of surfactants and/or nutrients (biostimulation); (c) presence of different species of vascular plants; and (d) aeration, are being investigated in parallel. The goal of the project is the choice of the best approach for further biological remediation of aged contaminated soils by petroleum hydrocarbons.

In this communication, it is reported results of the comparison of (a) bioremediation (natural attenuation) with (b) *Juncus maritimus* rhizodegradation, as well as (c) the efficacy of the addition of surfactant, bioaugment and both in terms of increasing total petroleum hydrocarbons (TPH).

A decrease of TPH was observed for the different treatments, which indicated that there was TPH degradation relatively to initial condition in every case. Natural attenuation was slightly more effective than rhizodegradation with transplanted *J. maritimus*, suggesting that the introduction of this plant in the contaminated soil (transplant) caused a disturbance in the chemical and biological environment that will require more time to be re-established. Nevertheless, a combination of rhizodegradation with bioaugmentation favoured TPHs remediation.

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Bioremediation with soils contaminated with benzene

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Soil contamination is related to industrial activities, disposal of industrial and municipal wastes, or environmental accidents. A small amount of an organic compound released in the soil is enough to contaminate large volumes of soil and groundwater, many times exceeding the limits of contamination defined by law. One of the most popular soil contaminant is benzene that is mainly used as an intermediate product to produce styrene, phenol and cyclohexane. For each specific case of soil contamination, it is essential to select the most appropriate remediation technology as well as to preview the remediation time and efficiency [1]. Bioremediation is a common remediation technology used. It uses micro-organisms activity to degrade the contaminants that are present in the soil. The ultimate goal of bioremediation is the mineralization of the harmful substances by their conversion into microbial biomass and harmless products of metabolism.

The preparation of the soils to the bioremediation tests consisted in the addition of water and substrate to the soil in order to induce good degradation conditions. The defined water content was 20% and the addition of substrate was 10 mL/kg_{soil}. The substrate consisted in a mixture of minE (base), a source of phosphate, lactate and yeast. Two factors were studied: natural organic matter content and the level of contamination. The first ranged from 14% to 24% and the second from 10 mg/kg_{soil} (legal level of contamination) to 175 mg/kg_{soil}. The bioremediation experiments were performed in several columns where the concentration of benzene in the gas phase was monitored. The remediation process was considered finished when the level of contamination in the soil reached the legal limit (10 mg/kg_{soil}) [2]. The time required to reach the legal level was considered the bioremediation time.

All the results in Table 1 showed that the bioremediation time decreased with the natural organic matter content and increased with the level of contamination. In any case, it is concluded that the indigenous bacteria that were present in the soil are able to biodegrade the benzene in the experimented conditions.

Natural organic matter content (%)	Level of contamination (ppm)	Bioremediation time (h)
14	70	117
	90	270
	120	728
24	96	238
	110	239
	135	298
	173	646

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Quality assessment of water supplies in Peixe-Boi town (State of Pará, Brazil) and adjustment proposal

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In many low-income countries, the precarious sanitation systems are the main causes of high taxes of intestinal diseases. In Brasil, this poor condition is a reality for many towns in the North region, such as Peixe-Boi, a small town in the State of Pará. The sanitary adjustment of water supply systems is possible through water quality monitoring and the introduction of treatment and disinfection methods compatible with economic, social and technological conditions. The aim of the work developed was to analyze water supply systems of the town of Peixe-Boi and possibly come up with solutions to better localize the wells and adequately treat water.

Five samples were collected from different wells, which are responsible for supplying water to different areas of the town. The parameters analyzed were pH, color, turbidity, TSS, TDS, conductivity, salinity, hardness, phosphate, ammoniacal nitrogen, nitrate, total and fecal coliforms. Open interviews were carried out with local people and possible contamination sources were identified.

High bacteria contamination was found in all systems analyzed, in rates above the acceptable limits established by Decree 518/2004 of the Brazilian Health Ministry [1]. Other parameters, such as pH (5,5), color (400 uC) and turbidity (60 uT) were also extremely high for the sample collected from the system controlled by COSANPA – Pará Sanitation Company. This system was the one with worst quality, showing the highest levels of conductivity (400 μ S/cm), nitrate (6 mg/L) and phosphate (1,5 mg/L). Although under the limits established by Decree 581/2004, this high level of nitrate is possibly due to anthropic contamination [2]. After the interviews, it was possible to conclude that the hardness, salinity and presence of iron in the drinking water were the factors which most annoyed local people. Amebiasis and giardiasis were frequent diseases among the population. It was also found that the lack of quality of the water supplied make people look for other sources of drinking water, which may not be adequate for human consumption either.

Although many parameters analyzed were not adequate to the Decree 518/2004, the most significant one was related to coliform contamination. It is then urgent that disinfection treatment be applied for fighting diseases of hydric veiculation in the town. Except from COSANPA system, all others ones – administrated by the local government – may be sanitarly adjusted by simple disinfection with sodium hypochlorite. It's also urgent that adequate protection of the wells is employed to avoid future contamination.

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Relevance of Temporal and Spatial Variability for Monitoring the Microbiological Water Quality in an Urban Bathing Area

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The microbiological quality of recreational waters arises as a major demand for the utilization of bathing areas. Although the present Bathing Directive (2006/7/EC) broke new ground in what monitoring, harmonized methods and practices of analysis are concerned, several questions remained unanswered. Diel and tidal variability was investigated in four urban beaches of Porto (NW Portugal), from June until August of the 2007. Hourly samples for microbiological analyses were collected, as well as measurements of water physical-chemical characteristics. During the study period, monthly variations of fecal indicators were only observed in the most polluted beaches. Despite the general trend for a higher fecal bacteria abundance during the morning period in all four beaches, only the less polluted beach exhibited significantly higher contamination during the morning ($p < 0.01$). Moreover, tidal phase did not influenced the diel pattern of bacteria. In order to ascertain the spatial distribution of indicator bacteria off the urban beach front, surveys were organized during the 2008 and 2009 covering 15 km² area. Bacteriological and physical and chemical data were mapped using GIS techniques. The influence of the rivers Douro and Leça, located at the end-members of the studied area, as well as small streams draining throughout the beaches were evident. Salinity was negatively correlated with the fecal bacteria. Results showed the negative contribution of polluted rivers and small streams on the water quality of urban beaches, calling the attention to the optimization of sampling protocols for monitoring the water quality of recreational waters.

Study of the viability of application of *Moringa oleifera* in the treatment of water for human consumption

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ABSTRACT

Moringa Oleifera is a native plant from India, and it grows nowadays in several tropical countries. In Angola, this plant can be found in the province of South Kwanza, although it seems that there are other areas in the country favorable to its growth. This study tested the applicability of the aqueous extract and seed of *Moringa oleifera* in two steps of treatment of a superficial water for human consumption: coagulation and flocculation. The tested water comes from Bengo river, one of the water supply origins for the city of Luanda.

This study showed that the ideal dose of *Moringa oleifera* extract is the one which corresponds to 80 mg_{seed}/L, and the ideal pH equal to 7. In these conditions the percentage of turbation removal is about 96%, obtaining a residual value inferior to 0,7 NTU. The treatment in perfect conditions shows as main disadvantage the introduction of organic matter into the water. For the ideal extract dosage the KMnO₄ oxidability turned into 31,2 mg O₂/L.

By determinating the organic content of *Moringa oleifera* extract, the obtained value for KMnO₄ oxidability was 3360 mg O₂/L and the TOC (total organic carbon) value was 1226 mg TOC/L.

Regarding the raw seed of *Moringa oleifera*, the best results were obtained for a dosage of 40 mg_{seed}/L at pH =7. In these conditions the percentage of turbation removal is 93%, obtaining a residual value inferior to 1,5 NTU. Also in these conditions, the higher concentration of organic matter in the water is the main disadvantage, detecting a KMnO₄ oxidability value of 23,7 mg O₂/L.

Key words: *Moringa oleifera*; Water Treatment; Chemical Coagulation; Flocculation; Water for Human Consumption; Bengo River

Extended-spectrum beta-lactamase producing *Enterobacteriaceae* in waste water treatment plant

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Extended-spectrum beta-lactamases (ESBL) are an antimicrobial resistance threat that has been spreading to community in the last years. ESBL producing isolates are usually resistant to all beta-lactams except the carbapenems and also to other groups of antibiotics, making treatment of infections by these bacteria, difficult. Fecal colonization by ESBL producing *Enterobacteriaceae* is a reality that might be observed for long periods and non-hospital healthcare associated infections, have been recently recognized as crucial for this type of antimicrobial resistance spread [1].

The waste water treatment setting, might function as a mirror of the type of ESBL producing *Enterobacteriaceae* colonization of the population, reflecting changes in the type of epidemiologically relevant types of ESBL.

Isolates were selected by sample spreading and by membrane filtration on Mac Conkey agar with oximinobeta-lactams. Colonies of lactose fermenters were randomly selected and screened for ESBL production, by the double disc synergy test and clavulanic acid addition, according to the CLSI guidelines [2]. Identification of the selected strains was achieved by classic biochemical tools. Susceptibility to antimicrobial agents was determined by the agar diffusion method, according to the CLSI [2]. Beta-lactamases were characterized by isoelectric focusing. Conjugation experiments were done in order to study transferability of ESBL genes.

Our work showed that ESBL producing *Enterobacteriaceae* are present in urban waste water treatment plants. Characterization of the ESBL type of the selected isolates will help to access the change of ESBL types in the last years.

ESBL transfer by conjugation was successful in some isolates, showing potential for transfer from this particular niche, to autochthonous bacteria of natural environments that might act as reservoirs of antimicrobial resistance genes.

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Is chromium (III) possible to be phytoremediated by *Solanum nigrum* L.? The beginning...

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The environmental pollution caused by heavy metals is, nowadays, a major ecological problem with disastrous future consequences to our planet. This problem affects all living organisms, from bacteria to animals, including humans. Therefore, there is a growing awareness of this fact, which led to the action of several health authorities worldwide. One of the emerging technologies to solve this problem is phytoremediation, the use of plants and their associated microbes for environmental cleanup [1]. This technology has gained acceptance in the past 15 years as a cost-effective and noninvasive alternative for engineering-based remediation methods. *Solanum nigrum* L. is a plant species that has been reported to hyperaccumulate heavy metals such as cadmium and zinc, and has the particularity of being a fast growing, easily adaptable and having a greater biomass than most hyperaccumulators [2], making it a potential candidate for phytoremediation and for the accumulation of other metals, such as chromium (III), which is a highly toxic environmental pollutant.

Thus, to verify the effect of chromium (III) on *S. nigrum* development, seeds were surface sterilized and incubated in a sterile nutrient solution (Hoagland solution [3]), supplemented with increasing concentrations of Cr (III): 0 μM , 125 μM , 250 μM , 375 μM and 500 μM . At the end of the fourth week, several seedling biometric parameters were assessed. Significant decreases on fresh weight and root length could be observed starting from the 375 μM treatment, whilst the shoot length significantly decrease only in the 500 μM treatment.

Control-derived seedlings were grown hydroponically for four weeks in Hoagland solution under 3 different situations: one set without Cr (III); another one exposed to 375 μM Cr (III); and the third consisted on a short shock treatment with 1000 μM Cr (III) throughout the last week. After this period, at least 3 plants from each growth condition were used for the determination of several biometric aspects. Roots and shoots from plants were frozen under liquid N_2 , grinded to a fine powder and stored at -80°C for future processing. It was possible to observe that there were no significant variations in root and shoot fresh and dry weight, length and water content, for both chromium (III) treatments.

These preliminary results reveal that *S. nigrum* can tolerate very high concentrations of chromium (III) in the rhizosphere. To further discriminate if this tolerance is due to an enhanced capacity to exclude this metal or to bioaccumulate it in plant tissues, the next approach will consist on chromium (III) quantifications on roots and shoots of the stored plant material. Future studies will also be performed to evaluate the degree of stress that plants are subjected when exposed to high concentrations of chromium (III), both at the biochemical and molecular levels.

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Can *Solanum nigrum* L. be use to phytoremediate nickel-polluted sites? The first steps...

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Contamination by heavy metals in ecosystems poses major environmental problems worldwide with substantial economical and health hazard consequences. Phytoremediation - the use of plants and their associated microbes to remove or immobilise contaminants [1] - may offer a low cost method for the remediation of heavy metals-contaminated soils. Various phytoremediation strategies are possible, with different phytotechnologies profiting from different plant properties. Concerning metal contamination of soils, specifically, the main treatment streamlines are phytoextraction and phytostabilisation. *Solanum nigrum* L. is a plant species that has been reported to hyperaccumulate heavy metals such as cadmium and zinc, and has the particularity of being a fast growing, easily adaptable and having a greater biomass than most hyperaccumulators [2], making it a potential candidate for phytoremediation and for the accumulation of other metals, such as nickel, which is a plant micronutrient and at the same time an environmental pollutant. It is well known that most of the micronutrients can be phytotoxic if when present in the rooting medium at elevated concentrations.

Thus, to assess the effect of nickel on *S. nigrum*, seeds were surface sterilized and incubated in a sterile nutrient solution (Hoagland solution [3]), supplemented with increasing concentrations of nickel: 0 μM , 0.5 μM , 7.5 μM , 30 μM , 50 μM and 100 μM . After 4 weeks of exposure, several seedling biometric parameters were assessed and significant decreases on fresh weight and root length could be observed starting from the 7.5 μM treatment, whilst the shoot length significantly decrease only in the 100 μM treatment.

Subsequently, plants were grown hydroponically for four weeks in Hoagland solution under 3 different situations: one set without Ni; another one exposed to 7.5 μM Ni; and the third consisted on a short shock treatment with 100 μM Ni throughout the last week. After this period, at least 3 plants from each growth condition were frozen under liquid N_2 , grinded to a fine powder and stored at -80°C for future processing. Several biometric parameters were analyzed and it was possible to observe a significant decrease in root and shoot fresh weight and length, in shoot dry weight, with a significant parallel increase in water content, for both treatments.

These preliminary results reveal that the exposure to nickel concentrations $\geq 7.5 \mu\text{M}$ cause deleterious effects to the plants, thus suggesting that this metal is detrimental to them. The next step in this study will consist on nickel quantifications on roots and shoots of the stored plant material in order to assess this plant species' nickel phytoremediation potential. Future studies will also be performed to evaluate the degree of stress that plants are subjected when exposed to high concentrations of nickel, both at the biochemical and molecular levels.

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Study of composition and energetic potential of landfill gas and its relation to the stages of anaerobic degradation

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The increased demand for alternative energy sources are milestones and also a current fact, which requires technological innovations for more efficient use of available sources. The management of solid waste also falls on this issue, in views to explore the possibility of generating power from existing landfills, which could provide financial autonomy to the system of waste management [1].

Landfill gas, also called biogas, is an alternative source of viable energy already found and tested in some landfills in Brazil, such as in Bandeirantes landfill in São Paulo. In this context, the present work has being developed with the aim to evaluate the general relationship between the composition of the gases generated in the landfill of the city of Rio Claro-SP during the stages of anaerobic degradation over periods of rain and drought, in order to verify the potential energetic of landfill gas generated in these conditions.

The determination of carbon dioxide has been adapted to the equipment by the method of Orsat, where a basic solution reacts with carbon dioxide making the rush to measure its concentration. The result of methane gas (CH₄) is obtained indirectly by estimating the difference in the result of CO₂ [2].

To estimate theoretical power generation at the landfill will be used the Model School Canyon, an empirical model of first order, widely accepted and used by industry and regulatory agencies, including U.S. EPA (Environmental Protection Agency) [3]. In the model, from the mass of waste per year and grounded the constant generation, defined as climatic conditions inherent characteristics of the landfill, we can improve the model, each increase in the amount of 1 year, and is obtained as result the rate of methane generation in m³/year.

The use of gas generated in landfills reduces the impact of emissions, is an alternative energy source (as is obtained by decomposing organic matter) and decentralized. The work is based so the study of gas generation in landfills in the municipalities of medium size, with a view to its use as an energy source, reducing the impacts of environmental degradation, and use the landfill as clean development mechanism (CDM), avoiding the emission of greenhouse gases.

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Study on the changes of soil chemical characteristics as result of prescribed fire

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Every year, particularly during the summer period, the Portuguese forests are devastated by forest fire that destroys their ecosystems. So in order to prevent these forest fires, public and private authorities frequently use methods for the reduction of combustible mass as the prescribed fire and the mechanical vegetation pruning. All of these methods of prevention of forest fires alter the vegetation layer and/or soil [1-2].

This work aimed the study of the variation of some chemical characteristics of soil that suffered prescribed fire. The studied area was located in the Serra of Cabreira (Figure 1) with 54.6 ha. Twenty sampling points were randomly selected and samples were collected with a shovel before, just after the prescribed fire, and 125 and 196 days after that event. The parameters that were studied were: pH, soil moisture, organic matter and iron, magnesium and potassium total concentration. All the analysis followed International Standard Methodologies.



Figure 1:
Serra of Cabreira before prescribed fire

This work allowed to conclude that: a) after the prescribed fire; i) the pH remained practically equal to the the initial value; ii) occurred a slight increase of the average of the organic matter contents and iron total contents; b) at the end of the sampling period compared to the initial values; i) the pH didn't change significantly; ii) the average of the contents of organic matter decreased; and iii) the average of the total contents of Fe, Mg and K increased.

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Optimisation of immunohistochemical procedures to detect adenosine transporters in vessels

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Introduction: Adenosine is an ubiquitous nucleoside involved in numerous physiological and pathophysiological processes, namely in vascular tissues [1]. Adenosine requires specific transport proteins to be moved into and out of the cell and, to date, four subtypes of Equilibrative Nucleoside Transporter (ENT) are known: ENT1, ENT2, ENT3 and ENT4 [2]. The aim of the present study was to improve the immunohistochemical procedures, in order to detect the presence of ENT subtypes.

Methods: In order to detect ENT subtypes different methodological approaches have been carried out to stain by immunohistochemistry perfused-fixed/paraffin-embedded mesenteric artery and vein tissue sections from Wistar rats. Briefly, tissue sections (artery and vein) were dewaxed in toluene and rehydrated in graded ethanol solutions. Next, slices were rinsed and treated either with 3% hydrogen peroxide (H₂O₂) for 5 min or 0.3% H₂O₂ for 30 min, in the dark at room temperature (RT). Sections were then incubated with blocking solution (10% normal horse serum albumin diluted in PBT- PBS with 3% Triton X-100) for 30 min at RT. Sections were, then, incubated with polyclonal IgG anti-ENTs primary antibodies (Santa Cruz Biotechnology, Santa Cruz, CA), using a range of dilutions from 1:125 to 1:500, in PBT, either overnight at 4°C or for 1 h at 37°C. After incubation with primary antibodies, sections were incubated with biotinylated secondary antibody (1/125: Vectastain Elite ABC kit; VectorLaboratories, Burlingame, CA) 1 h, RT. Subsequently, immunoreactivity was amplified by incubating tissues with the avidin-biotin complex reagent (ABC: Vectastain Elite ABC kit) 1h, RT. Next, 3,3-diaminobenzidine tetrahydrochloride (DAB; activated by H₂O₂) was used as a chromophore. Sections were counterstained (hematoxylin), rehydrated with ethanol/xilol solutions, mounted with Eukitt mounting medium (O.Kindler, Freiburg, Germany) and visualized with Nikon eclipse E400 microscope (Nikon, Tokyo, Japan).

Results and Conclusions: Methodology procedures were optimized for the use of ENT antibodies. Improved immunohistochemical procedures include sequential incubation of tissue sections as follow: 3% hydrogen peroxide (H₂O₂) for 5 min, blocking solution (10% normal horse serum albumin diluted in PBT) for 30 min at RT, primary antibody for ENT (1/250), overnight at 4°C; tissues will then be incubated with secondary antibody and ABC kit, and specific immunoreactivity will be revealed using DAB. This methodology will allow performing further experiments in order to characterize the pattern of distribution of these adenosine transporter subtypes and also to evaluate its involvement in hypertension by comparing its presence and distribution in vascular tissues from normotensive and hypertensive rats.

Acknowledgements:

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Toxicity of the pharmaceutical Simvastatin to the cyanobacterium *Microcystis aeruginosa*: does good manufacturing practice influence the biological response?

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Monitoring drug residues in the aquatic environment has gained importance in recent years, as many pharmaceutical compounds can be found in sewage treatment plant effluents and freshwater reservoirs. Generally, pharmaceuticals are specifically designed to penetrate biological membranes and reach universal molecular systems, thereby increasing the probability of unexpected consequences for a number of species. Freshwater phytoplankton species are constantly exposed to these compounds. This work aimed at investigating the effects, on freshwater phytoplankton, of simvastatin, a lipid-regulating drug of the statin class, which inhibits the production of cholesterol by the liver. Cyanobacteria were chosen, since they are common in eutrophic natural waters and may constitute an important part of the phytoplankton community.

A strain of *Microcystis aeruginosa*, (LEGE 05195) isolated from Torrão reservoir (Tâmega river) was grown in fraquil culture media doped with concentrations of simvastatin, that ranged environmental levels to potentially toxic ones (10 ngL⁻¹ to 100 mgL⁻¹). Two batches of simvastatin were tested in parallel, one manufactured according to the good manufacturing practices (GMP) and the other manufactured without GMP. The *M. aeruginosa* response to both batches of simvastatin was assessed through monitoring the growth. Results have shown that the growth of *M. aeruginosa* subjected to both GMP-simvastatin and non-GMP-simvastatin is statistically different, non-GMP-simvastatin being causing a higher inhibition of growth at a given concentration. For example, for a concentration of 100 µgL⁻¹ the percentage of inhibition of growth was 28% for GMP-simvastatin and 54% for non-GMP-simvastatin. These results are valuable for the pharmaceutical manufactures since the European industry, which observes expensive GMP, is subjected to competition from other countries, at lower prices but without GMP.

Acknowledgements

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Hydrocarbon degradation by *Planctomycetes*

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Planctomycetes are organisms that live in almost all the ecosystems and utilize carbohydrates as the major carbon sources [1]. They possess unusual characteristics such as their reproduction mode by budding, peptidoglycan-less cell wall and membrane-bounding compartmentation. Although their widespread distribution and numerical abundance revealed by molecular techniques, in particular in marine environments, there is still a lack of information regarding their metabolic potential in bioremediation of hydrocarbons, a common group of pollutants of these environments. Data refer that they tolerate low concentrations of hydrocarbons but it is unknown if they really utilize these compounds as source of carbon and energy. In this work the ability to metabolize hydrocarbons by seven strains of *Planctomycetes* (OJF7, FC9.2, UC8, Cor3, UF13, FC18 and FF15) was tested. In order to reach this aim a solid 607 medium [2] was modified to provide a minimal concentration of nitrogen and carbon source that allow the growth of all the strains in study - control (only 1/10 of the original yeast extract content and no peptone and glucose added). Different formulations of this base medium were made by the addition of 1% and 5 or 10% of hydrocarbons (diesel fuel, unleaded gasoline, petroleum, turbine oil, fuel oil and toluene). Each medium was inoculated with 3 drops (10 µL each) of a pure bacterial suspension of all strains and the incubation was performed at 26°C in darkness during 3 weeks. The results showed that all the strains tested can grow in the presence of these hydrocarbons with the exception for the unleaded gasoline at 10%. When compared to control, OJF7 degrades intensively fuel oil and to a less extent also petroleum. Fuel oil was also utilized by FC9.2 and UC8 strains. This study confirms the tolerance of *Planctomycetes* to a broad range of hydrocarbons and points the evidence that some strains can utilize some of these compounds as a source of carbon and energy clarifying their role in cleanup of oil polluted environments.

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Does macroalgae extracts support *Planctomycetes* growth?

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Planctomycetes, a poorly known group of budding Bacteria, have unique characteristics, such as absence of peptidoglycan in their cell walls and special intracellular compartmentalization. They are ubiquitous and abundant in many kinds of habitats, as revealed by the application of molecular microbial ecology techniques. They have been described in probable association with sponges, crustacean, prawns, macroalgae [1], cyanobacteria and microalgae.

Medium 607 is an expensive and time consuming option for culturing these microorganisms. Studies were conducted to verify whether the extracts of macroalgae, including *Ulva* sp. and *Fucus spiralis*, support the growth of planctomycetes, as well as determining which extract sterilizing treatment would be more convenient. The used strains of planctomycetes were: UF13, FC18, FC9.2, UC8, FF15, OJF7 and COR3 [1]. For our research we made media with macroalgae extracts as the only source of C and N that have been subjected to different types of sterilization treatment. Each medium was inoculated with 3 drops (10 µL each) of a pure bacterial suspension of all strains and the incubation was performed at 26°C in darkness during 3 weeks. Cultures in medium 607 have been used as positive controls.

Talus extract of *Fucus spiralis* best supports the growth of planctomycetes relatively to *Ulva* sp., especially under UVs, autoclave and filtration sterilization treatments. Chemical (fungicide plus antibiotic) or absence of sterilization impacted negatively in the growth of planctomycetes. The strains that better grew in the different media were the FF15, OJF7 and Cor3. The strain UF13 almost did not grow in any of the media assayed. The mixture of both extracts was less or equally growth efficient when compared to the extracts isolated. A similar result was achieved when *Fucus spiralis* extracts were obtained from the reproductive zone. Growth capability has been found to depend not only on the sterilization treatment employed but also on the strain of planctomycetes. Therefore, *Ulva* sp. and *Fucus spiralis* extracts are capable of supporting planctomycetes growth, but the latter stands as the most efficient alternative.

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Red Fox (*Vulpes vulpes*) populations in Portugal

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The Red Fox, *Vulpes vulpes*, has a large distribution area (most of northern hemisphere) and has the widest geographical range of any member of the order Carnivora. Although natural habitat is dry, mixed landscape, with abundant "edge" of scrub and woodland, there are also some urban populations [1]. Surprisingly, the information available about the species in Portugal is scarce as compared with some other Portuguese Carnivora species [2], so an effort to characterize Red Fox populations has recently began.

As Red Fox hunting is allowed in Portugal, hunter's clubs and associations are being contacted since the beginning of the hunting season in order to gather information about the Portuguese populations. We ask hunters to send us a photograph of each animal and to register each fox's body and tail length, weight and sex. When we are offered the carcasses data collected include tooth observation for age allocation, several other length measurements (body, tail, ear, hind foot and shoulder height) and weight [3]. Several photographs of each animal are taken. Hair and tissue samples are preserved for future analysis. Carcasses are then freeze up and later sent to be examined by a UTAD veterinary team searching for pathologies and parasites. The size of the hunting areas and the number of hunters involved are registered when available. On the end of the hunting season additional contact will allow to obtain final numbers of foxes killed. A number of hunters and hunting associations have also contacted us, following project divulgation in the specialized press. A database with all data on distribution, abundance, sex ratio and size is being built.

Only preliminary results are available because the hunting season is not yet finished and main hunting effort occurs during January and February. A total of 20 adult Red Foxes from different locations in Portuguese territory where already obtained, mainly from game-drive hunting. Sex ratio is near equilibrium. Males are, as expected, bigger, have longer tails and are heavier than vixens. The expected increase of the sample size will allow a more detailed analysis.

The results will hopefully allow to estimate Red Fox population density throughout the Portuguese territory and to characterize the morphology and ecology of the Portuguese populations, as well as the hunting pressure they are submitted to.

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Assessment of genetic diversity within the lizard *Eumeces algeriensis* from Morocco using 12s and 16s rRNA sequences

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Eumeces algeriensis Peters 1864 is a North African skink lizard which occurs in Morocco and north Algeria. There are two currently recognized sub-species: *E. algeriensis algeriensis* and *E. algeriensis meridionalis*. *E. a. algeriensis* occupies the major part of the Moroccan distribution while *E. a. meridionalis* is only found in eastern Morocco and northern Algeria. This taxonomic differentiation is based on morphological characters, and until now, no genetic study has been done to corroborate it. The aim of this work was to analyse for the first time the genetic diversity of this species within Morocco and to assess if biogeographical barriers such as the Atlas and Rif Mountains in Morocco cause genetic variation within the species *E. algeriensis*, since this is the case in several other species studied from this region. To do this, mitochondrial DNA sequences of 12s and 16s rRNA genes were analysed. Preliminary analyses suggest that two divergent lineages may exist in this area, one widely spread across central and north Morocco, and the other in the far south, in the Anti-Atlas region. Results are discussed in relation to biogeographic patterns found in other species.

Bioactivity of flavonoids against *Leishmania infantum* determined by flow cytometry

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In humans, *Leishmania* spp. causes a variety of clinical diseases due to the ability of the organism to proliferate in deep tissue or close to the skin surface. Certain species of the parasite have been associated with the different clinical forms of the disease, in particular, *Leishmania infantum*, the causative agent of visceral leishmaniasis in the Mediterranean basin [1]. Historically, the chemotherapy of leishmaniasis has been based on the use of toxic heavy metals, particularly antimony compounds. Whenever these kinds of drugs are no longer effective, some others are used, including pentamidine and amphotericin B. These chemicals have to be injected and clinical care or hospitalization during treatment may be necessary due to possible side effects; thus other treatments are needed. Extracts from medicinal plants or compounds derived from them are a valuable source of new medicinal agents for treating Leishmaniasis [2] and other diseases. The leishmanicidal effect may reside in its phytochemical component such as flavonoids.

In the present study, we have investigated the effect of several flavonoids on the different proliferative stages of *Leishmania infantum* protozoan. A preliminary assessment using green fluorescent protein (GFP) expressing promastigotes was later on complemented with an evaluation using intracellular amastigotes in macrophages. At the same time, an evaluation of the possible cytotoxicity of the natural compounds was carried out using the human leukaemia monocyte cell line (THP-1 cells). The GFP-expressing parasite (promastigotes or intracellular amastigotes) were quantified by flow cytometry (FACS), and used to identify the anti-*Leishmania* activity of the screened compounds. This drug screening assay was validated using standard antileishmanial drugs.

Our results demonstrate that GFP-expressing parasites could be used in drug screening by flow cytometry and have identified new natural compounds as promising anti-*Leishmania* agents.

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Safety of minimally processed garlic (*Allium sativum* L.) cloves treated with hydrogen peroxide

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Consumption of minimally processed vegetables has increased due to benefits of their convenience and freshness to the consumer. In spite of such advantages, minimally processed commodities have the limitation of rapid quality deterioration and short shelf life due to tissue damage caused by processing. Minimal processing accelerates physiological change and promotes growth of spoilage microorganisms. The maximum acceptable values of contamination for these products are: for total microbial count 10^6 CFU/g, for moulds up to 10^3 CFU/g and for yeasts 10^5 CFU/g [1]. The effect of different disinfection treatments, as alternatives to chlorine, was investigated on the quality retention of minimally processed garlic stored at different temperatures. Previous studies have proven that freshly diced garlic cloves, sanitized by dipping in a 5% solution of H_2O_2 , for 2 minutes, and stored at 4 °C, under ambient air, could adequately retain their overall quality up to 10 days [2]. The present study aimed at studying the effect of disinfection with hydrogen peroxide against the classical use of hypochlorite, regarding microbial growth and therefore the safety level provided by the chosen alternative method. Garlic cloves were peeled, washed in tap water at 0 °C and cut into small cubes: app. 0,5x0,5x0,5 cm, submitted to one of the following sanitizing treatments: hypochlorite or hydrogen peroxide (H_2O_2), and centrifuged to remove excess water, when needed. The samples were stored at 4, 8 and 12 °C. Total microbial counts and moulds and yeasts counts were obtained up to 192 hours, at 4 °C, and up 96 hours at 8 and 12 °C. The effect of temperature was the most relevant, ensuring the safety of the product up to the 192 hours at 4 °C. Regarding the use of hydrogen peroxide it yielded the same degree of protection as hypochlorite.

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Anti-norovirus activity of 4'-methoxy-2-styrylchromone and 5-hydroxy-2-styrylchromone: a first insight into their mechanism of action

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Human noroviruses (NoV) are now recognized as the most frequent cause of outbreaks and sporadic cases of acute gastroenteritis in both children and adults. They are responsible for ~50% of all foodborne gastroenteritis outbreaks worldwide. Despite the significant economic impact and considerable morbidity of norovirus disease, no drug or vaccine is currently available to treat or prevent this disease, therefore the discovery of anti-norovirus drugs is urgent.

Our previous studies have resulted in the discovery of an interesting chemical family with anti-norovirus activity, the 2-styrylchromones. Two of these compounds, 4'-methoxy-2-styrylchromone and 5-hydroxy-2-styrylchromone have shown such a potent anti-norovirus activity ($IC_{50} < 7 \mu M$) that were considered lead compounds and therefore deserve to be investigated for their mechanism of action underlying their effect in norovirus replication.

The aim of the present study was: (i) to determine if 4'-methoxy-2-styrylchromone and 5-hydroxy-2-styrylchromone exert their anti-norovirus activity in a dose-dependent manner and (ii) to investigate which phase of viral life cycle is affected by these compounds, namely viral entrance (attachment, penetration and uncoating), viral replication (RNA synthesis, transcription, pos-transcriptional modifications of mRNA) or virus assembly and release.

The anti-norovirus activity of 4'-methoxy-2-styrylchromone and 5-hydroxy-2-styrylchromone was evaluated by plaque reduction assay, using the cultivable and genetically related murine norovirus (MNV) propagated in the murine macrophage cell line RAW 264.7 as a surrogate model to the non-cultivable human NoV. Dose-dependency and time-of-(drug) addition studies were performed. Toxicity of compounds to RAW cells was evaluated by the MTT assay.

Results showed that 4'-methoxy-2-styrylchromone and 5-hydroxy-2-styrylchromone exerted their anti-norovirus activity in a dose-dependent way. Time-of-(drug) addition studies revealed that these compounds interfere less with the early steps of virus life cycle than with later steps of viral replication. This may include either the blocking of viral enzymes involved in RNA replication (e.g. RNA-dependent RNA polymerase) or proteolytic maturation or an interference with virus release. Additional studies are needed to unveil the specific viral target of these 2-styrylchromones which will include the generation of drug-resistant virus and their molecular characterization.

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Search for selective modulators of human caspase 3 and 7, using a yeast expression system

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Caspase 3 and 7 are members of the cysteine protease family with a crucial role in the execution of apoptosis, therefore representing promising pharmacological targets in anticancer therapy [1]. Several flavonoids, such as 3,7-dihydroxyflavone and baicalein, showed to inhibit cell survival by activation of a caspase-dependent apoptotic pathway [2]. Furthermore, it was suggested that prenyl side chains increase flavonoids activities, namely the antiproliferative effect against different human tumour cell lines [3].

Saccharomyces cerevisiae has been used by our group to express individual caspase family members in order to search for selective modulators of these proteins. As described for human cells [1], we confirmed, by cell viability assays, analysis of plasma membrane integrity, DNA fragmentation and reactive oxygen species production, that expression of human caspase 3 or 7 in yeast causes a marked growth inhibition associated with the induction of an apoptotic cell death. Based on this, activators and inhibitors of caspase 3 and 7 will enhance and decrease, respectively, caspase-induced cell death, without interfering with control yeast (without expression of human caspase). Using this yeast phenotypic assay, we analysed the effect of several flavonoid derivatives obtained by CEQUIMED-UP group, baicalein (**1**), 3,7-dihydroxyflavone (**2**), 7-prenylbaicalein (**3**), 7-geranylbaicalein (**4**), 3-hydroxy-7-prenyloxyflavone (**5**), 3-hydroxy-7-geranyloxyflavone (**6**) and artelastin (**7**), with cytotoxic effect on human tumour cell lines.

The results obtained revealed a differential modulation of caspase 3 and 7 by these flavonoids. Compounds **2**, **4** and **5** behaved as selective activators of caspase 3, while compounds **3**, **6** and **7** behaved as selective activators of caspase 7. Compound **1** did not interfere with both caspases. In conclusion, this work establishes a first line screening approach that contributes for the search of new selective caspase 3 and 7 modulators in a more efficient way.

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Contribution of instant coffee substitutes to chromium daily intake

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Coffee beverages are of the most consumed and appreciated drinks all over the world, mostly because of their content in caffeine and their sensorial characteristics [1]. Besides coffee, other compounds may be present in similar beverages such as roasted chicory, barley, malt and rye. These products are called coffee substitutes and consist in mixtures of several cereals usually with a certain percentage of coffee. Consumers look increasingly for these products due to their inferior or absent content in caffeine and because they are cheaper than coffee. Although these beverages should theoretically be good sources of some minerals there is very little quantitative information on their contribution to total mineral intakes.

The characterization and quantification of metals were brought to the scientific attention because of the health issues they raise. Depending on the physicochemical form, given the variability of metabolic interactions involved in causes and effects, chromium may have toxic effects or may be essential in the human body. Up to this date, the compounds with chromium (VI) have been considered by International Agency for Research on Cancer (IARC) as carcinogenic to humans. On the other hand, trivalent chromium is considered an essential element when linked to the metabolism of lipids and carbohydrates, in concentrations of about 100 µg/kg. A very important factor to explain the relations above is that chromium (III) increases insulin binding to cells, which helps in reducing risk factors for cardiovascular disease and type 2 diabetes. While high concentrations of chromium (III) increase the synthesis of fatty acids and cholesterol in the liver, the physiological doses (and lower) appear to lower cholesterol existing in serum [2].

The aim of this work is to evaluate the daily dietary intake of chromium by consumption of instant coffee substitutes available in the Portuguese market. The chromium content was quantified by high resolution continuum source graphite furnace atomic absorption spectrometry and the data discussed in accordance with the beverage composition (coffee, chicory, malt, barley and rye).

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Evaluation of the paracrine mechanisms of several breast cancer cell lines on osteoclastic development

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Although its rigid structure, bone is one of the most frequent tissues affected by tumor metastasis. Bone metastasis can be divided in three distinct types: osteolytic, osteoblastic or mixed. Among the tumors that origin bone metastasis, breast cancer is one of the most frequent, originating usually osteolytic metastasis [1, 2].

Osteoclast differentiation and activation, a process called osteoclastogenesis, is a tightly regulated process, involving, for example, the action of osteoblastic cells [3]. However, in order to have conditions suitable for tumor cell proliferation in the bone, this tissue has to be previously remodelled, by activation of osteoclastic cells. In this context, paracrine communications between osteoclasts (or their precursors) and tumor cells appear as a potentially key player in the development of osteolytic metastasis.

The aim of this work is to evaluate the differentiation and activation of osteoclastic cells in the presence of conditioned media from four human breast cancer cell lines (HTB-22, HTB-126, HTB-133 and SK-BR-3), collected at different culture periods (48 hours, 7 days and 14 days). Cultures will be performed in the absence or presence of several inhibitors of signaling pathways involved in osteoclastogenesis, in order to characterize the mechanisms affected by the conditioned media supplementation. Cell cultures will be assessed for total protein content, tartrate resistant acid phosphatase (TRAP) activity, presence of multinucleated cells positive for TRAP and expression of several osteoclast-related genes and presence of multinucleated cells expressing the osteoclastic features actin ring and calcitonin and vitronectin receptors.

It is expected to observe an increase in the osteoclastogenesis degree, when osteoclastic precursors were treated with conditioned media from the breast cancer cell lines. It is also important to compare if the signaling pathways affected by the conditioned media are the same among the different cell lines tested.

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Analysis of the effect of different fluoroquinolones in the differentiation and activation of human osteoclastic cells

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Bone is a dynamic tissue that is in constant remodeling, by the action of the bone-synthesing osteoblasts and the bone-resorbing osteoclasts. Osteoclast differentiation and activation is regulated mainly by osteoblastic cells [1]. Imbalance between this osteoblastic and osteoclastic activities can lead to skeletal disorders, such as osteoporosis, for example.

Fluoroquinolones are a family of antibiotics that, due to its high spectrum of antimicrobial activity, are clinically used in many different pathological conditions, like, for example, urinary, respiratory and bone infections [2]. Among the secondary effects associated with fluoroquinolones administration are bone joint problems, like arthropathies and cartilage lesions [2, 3]. Due to this fact, pediatric administration of fluoroquinolones is not recommended.

With this work it is expected to evaluate the effect of different fluoroquinolones on osteoclastogenesis. Osteoclastic precursor cells will be isolated from human peripheral blood and will be cultured in the presence of different concentrations of five different fluoroquinolones. The range of concentrations tested is $0,3 \times 10^{-3}M$ – $0,3 \times 10^{-7}M$. The fluoroquinolones tested are levofloxacin, ofloxacin, norfloxacin, ciprofloxacin and moxifloxacin. In order to evaluate the cellular mechanisms affected by fluoroquinolones treatment, cultures will be performed in the absence or presence of several inhibitors of signaling pathways involved in osteoclastogenesis. Cell cultures will be assessed for several biochemical and molecular biology parameters, namely, total protein content, tartrate resistant acid phosphatase (TRAP) activity, presence of multinucleated cells positive for TRAP, expression of several osteoclast-related genes and presence of multinucleated cells expressing the osteoclastic features actin ring and calcitonin and vitronectin receptors.

It is expected to observe different effects of the distinct fluoroquinolones on the osteoclastogenic process, leading, at least in some cases, to an increase in that process.

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Nickel analysis of coffee substitutes by high resolution continuum source graphite furnace atomic absorption spectrometry

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Coffee is considered one of the world's most popular drinks, being appreciated for its flavour and stimulating effect. Its complex chemical composition makes the consumers exposed to several components, which have been the subject of numerous studies over the years [1]. Despite some information showing potential benefits with moderated coffee consumption, namely in Alzheimer disease, various adverse health effects could be considered in some individuals, taking advantage of using coffee substitutes. The instant coffee substitutes are mainly composed by roasted cereals. Besides contributing to a large portion of our daily calories supply, cereal products are also nutritionally important due to their content in dietary fibers, a wide range of micronutrients and in bioactive components including minerals, vitamins, antioxidants, as well as other bioactive compounds [2].

Nickel is a naturally occurring element, being present in soil, water, air and in the biosphere itself. Nickel is present in several foods and is the most common skin allergy-inducing metal. Nickel dietary ingestion is reported to be within 25 to 35 µg/day but its biochemical roles and functions are not yet defined [3] taking the European Food Safety Authority to consider that it has no known beneficial biological function in humans.

In this study, the nickel amount present in instant coffee substitutes (with and without blended coffee; n=50) was determined by high resolution continuum source graphite furnace atomic absorption spectrometry (HR-CS AAS). All measurements were carried out using an AnalytikJena ContrAA 700 spectrometer equipped with a xenon short-arc lamp operating in hot-spot mode (XBO 301, 300 W, GLE, Berlin, Germany). The beverages were prepared by dissolution in hot water, as recommended by the manufacturer, and no other pre-treatment of samples was performed except acidification with suprapure nitric acid (65%, v/v). The performance characteristics of this recent technique, namely accuracy, repeatability and reproducibility were evaluated. The values obtained for the coffee substitutes are discussed.

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Assessing the chemical composition and bioactivity of *Asparagopsis armata* (Rhodophyta)

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The discovery of new molecules with interesting biological or technological properties is actually a priority. Until recently the search for these compounds was mainly focused on terrestrial species, but due to the area occupied by oceans and to their particular characteristics, marine organisms have attracted attention. For this study *Asparagopsis armata*, a red macroalgae species, was chosen. Phenolic compounds, organic acids, volatiles, saponins and alkaloids were determined in the aqueous lyophilized extract of the species, by chemical and chromatographic (HPLC-DAD, HPLC-UV and HS-SPME/GC-MS) procedures.

Five organic acids (oxalic, ketoglutaric, malic, quinic and succinic acid) and 26 volatile constituents (which included aldehydes, norisoprenoids and terpenes, among others) were determined. No phenolic compound or alkaloid was noticed, but the presence of saponins was confirmed.

In order to access its biological potential, antioxidant capacity was evaluated by spectrophotometric microassays. No activity was found against DPPH, but a concentration-dependent protective effect was observed against superoxide ($IC_{25} = 329 \mu\text{g/ml}$) and nitric oxide ($IC_{25} = 115 \mu\text{g/ml}$) radicals (Fig. 1).

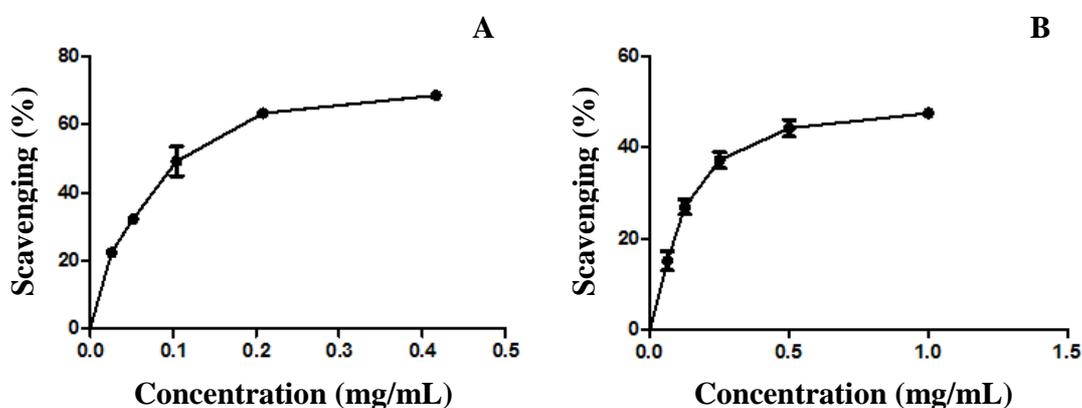


Fig. 1. Scavenging ability of the aqueous lyophilized extract of *Asparagopsis armata* against superoxide radical (A) and nitric oxide (B). Results show mean \pm standard error of three determinations.

Acknowledgments: To Fundação para a Ciência e Tecnologia for financial support (PTDC/AGR-AAM/64150/2006).

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Tomato (*Lycopersicon esculentum*) seeds: new flavonoids and cytotoxic effect

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Lycopersicon esculentum Mill. fruit (tomato) is among the most studied vegetable species. However, only few works were performed on its seeds. In this study, seeds of *L. esculentum* ("Bull's heart" cultivar) were analysed by HPLC/UV-PAD/MSⁿ-ESI. Fourteen flavonoids were identified, including quercetin, kaempferol and isorhamnetin derivatives, with thirteen of them being reported for the first time (Fig. 1).

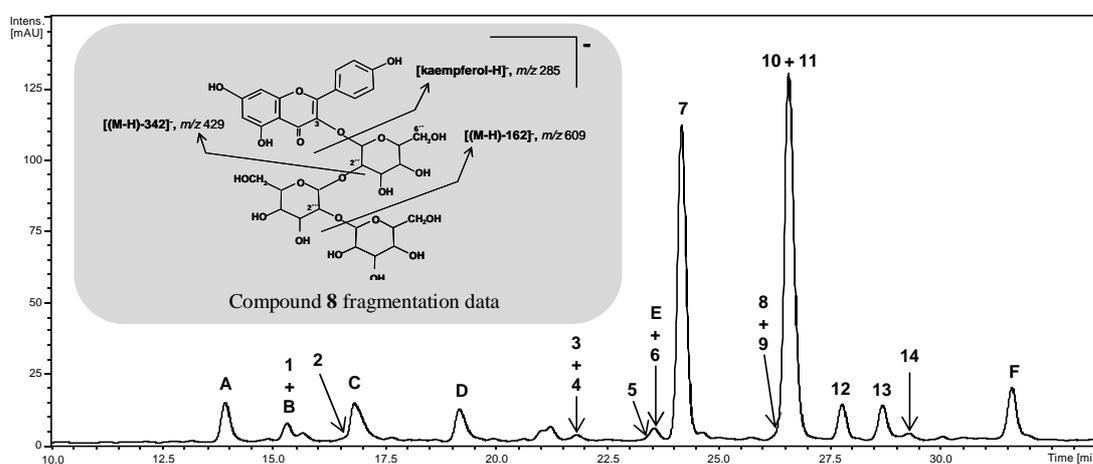


Fig. 1.

HPLC phenolic profile of tomato seeds. Detection at 350 nm. Peaks: (1) quercetin-3-*O*-sophoroside-7-*O*-glucoside, (2) kaempferol-3-*O*-sophoroside-7-*O*-glucoside, (3) quercetin-3-*O*-gentiobioside-7-*O*-glucoside, (4) quercetin-3-*O*-sophoroside-7-*O*-rhamnoside, (5) kaempferol-3-*O*-sophoroside-7-*O*-rhamnoside, (6) isorhamnetin-3-*O*-sophoroside-7-*O*-rhamnoside, (7) quercetin-3-*O*-sophoroside, (8) kaempferol-3-*O*-(2-sophorosyl)glucoside or kaempferol-3-*O*-glucosyl-(1→2'')-glucosyl-(1→2')-glucoside, (9) quercetin-3-*O*-(2-pentosyl)rutinoside or quercetin-3-*O*-(2-pentosyl, 6-rhamnosyl)glucoside, (10) kaempferol-3-*O*-sophoroside, (11) isorhamnetin-3-*O*-sophoroside, (12) isorhamnetin-3-*O*-gentiobioside, (13) quercetin-3-*O*-rutinoside and (14) kaempferol-3-*O*-(2-pentosyl)glucoside, (A-F) non identified compounds.

A significant cell proliferation inhibition (over 80%) against rat basophile leukemia (RBL-2H3) cell line was observed with the aqueous extract (IC₅₀=5980 μg/mL). A concentration-dependent acetylcholinesterase inhibitory activity was verified (IC₂₀=2400 μg/mL). The same behavior was noticed regarding antioxidant capacity, evaluated against DPPH (IC₁₀=284 μg/mL), nitric oxide (IC₂₅=396 μg/L) and superoxide radicals (IC₂₅=3 μg/mL).

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Insights into *Brassica oleracea* var. *acephala* metabolites and bioactivity

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In this work, phenolics and organic acids profiles of kale (*Brassica oleracea* var. *acephala*) seeds were analysed by HPLC/UV-PAD/MSn-ESI and HPLC-UV, respectively. Antioxidant capacity and acetylcholinesterase (AChE) inhibitory activity were determined using spectrophotometric microassays.

Several phenolic acids and flavonol derivatives were identified. The seeds of this *B. oleracea* variety exhibited more flavonol derivatives than those of tronchuda cabbage (*Brassica oleracea* var. *costata*), also characterized herein. Quercetin and isorhamnetin derivatives were found only in kale seeds. Oxalic, aconitic, citric, pyruvic, malic, quinic, shikimic and fumaric acids were the organic acids present in these matrices, being malic acid predominant in kale and citric acid in tronchuda cabbage seeds.

AChE inhibitory activity was determined in aqueous extracts from both seeds. Kale leaves and butterflies, larvae and excrements of *Pieris brassicae* reared on kale, were also evaluated. Kale seeds were the most effective AChE inhibitor, followed by tronchuda cabbage seeds and kale leaves (Fig. 1). In what concerns to *P. brassicae* material, excrements exhibited stronger inhibitory capacity. These results may be explained by the presence of sinapine (Fig. 1), an analogue of acetylcholine, only in seeds. A strong concentration-dependent antioxidant capacity against DPPH, nitric oxide and superoxide radicals was observed for kale seeds.

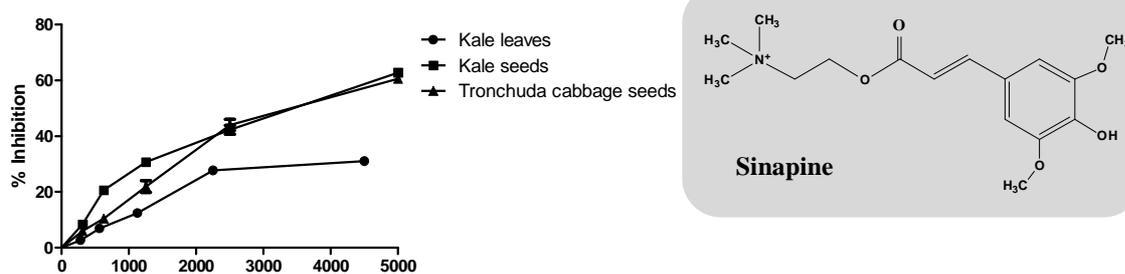


Fig. 1. Sinapine structure and AChE inhibitory effect of kale leaves and seeds and tronchuda cabbage seeds aqueous extract. Values show mean \pm SE from 3 experiments performed in triplicate.

These results open another perspective for the medicinal use of these natural matrices as a source of bioactive compounds to treat chronic diseases, such as Alzheimer.

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***Ficus carica* latex: chemical assessment and *in vitro* antioxidant capacity**

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Ficus carica L., the common fig, is a species of great commercial importance, comprising numerous varieties with significant genetic diversity. All *Ficus* species possess latex-like material within their vasculatures, affording protection and self-healing from physical attacks. *F. carica* latex has been traditionally used in the treatment of gout, ulcers and warts, among other situations, given its proteolytic and keratolytic effects, associated with its viscosity.

In this work, volatile compounds were determined by Head Space-Solid Phase Microextraction/Gas Chromatography-Ion Trap-Mass Spectrometry (HS-SPME/GC-IT-MS), being identified 34 compounds, distributed by distinct chemical classes: aldehydes, alcohols, ketones, monoterpenes, sesquiterpenes and miscellaneous compounds (Fig. 1).

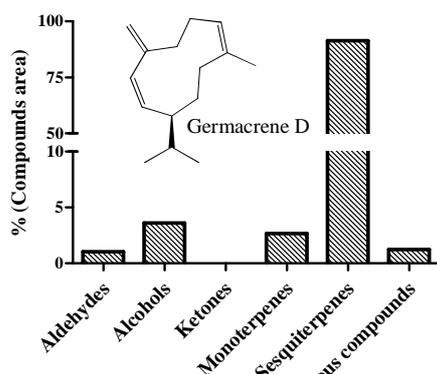


Fig. 1. Volatiles profile of *Ficus carica* latex and germacrene D, the main sesquiterpene.

Organic acids profile was also characterized by HPLC-UV and oxalic, citric, malic, quinic, shikimic and fumaric acids were determined. Malic and shikimic were the most abundant acids, each representing ca. 26% of total organic acids content.

The antioxidant potential of this material was checked by distinct *in vitro* chemical assays. A concentration-dependent activity was noticed against DPPH (IC₂₅=1049 µg/mL), nitric oxide (IC₂₅=1768 µg/mL) and superoxide (IC₂₅=291 µg/mL) radicals. Additionally, acetylcholinesterase inhibitory capacity was evaluated, but a weak effect was found.

The results obtained are very promising, constituting a base for the possible application of this matrix in food, cosmetic and pharmaceutical industries, due to its antioxidant capacity. However, some precautions regarding the direct application of latex are needed, because this matrix presents corrosive properties.

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Inhibition of angiogenesis and inflammation by a xanthohumol-enriched beer in a rat skin-wound healing model

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Xanthohumol (XN), the principal flavonoid of the hop plant (*Humulus lupulus* L.) and a constituent of beer, has been suggested to have potential cancer chemopreventive activities [1]. Angiogenesis, the formation of new blood vessels from pre-existing ones, in adulthood is localized and self-limited in time, as happens in tissue regeneration, and it is closely related with inflammatory process [2]. It is well known that most cancer chemopreventive agents show antiangiogenic properties *in vitro* and *in vivo*, a concept we termed “angioprevention” [3].

Our aim was to evaluate the effects of a XN-enriched beer on angiogenesis and inflammation, in the skin-wound healing process.

For skin wound-healing assay, two full skin-thickness longitudinal incisions were created on the dorsal skin of Wistar rats, after the consumption of a stout beer enriched with 10 mg XN/L and a control stout beer (without XN) during 30 days. Beverages consumption was maintained until day 7 after skin incisions. The number of vessels formed in the incision area (vWF staining), and the nitric oxide (NO) release, N-acetylglucosaminidase (NAG) activity and IL-1 β content in serum were measured. Statistical difference between various groups was evaluated by ANOVA followed by the Bonferroni test. Student's t-test was used for comparison between two groups. Differences were considered significant whenever $p < 0.05$.

The consumption of XN-enriched beer led to decreased number of vessels formed and decrease NAG activity, NO released as well as IL-1 β content. The *in vivo* modulation of angiogenic and inflammatory effects by XN occurred in accordance with our previous *in vitro* results and also occurred when XN is topically administered in the same *in vivo* model.

The nutritional supplementation of beer with XN manifested anti-angiogenic and anti-inflammatory properties. These findings emphasize the cross-talk between angiogenesis and inflammation and, provide clues to the development of useful therapeutic agents against inflammation- and angiogenesis-associated pathologies. These findings also suggest that these polyphenols may affect wound healing process, in what concerns inflammation and angiogenesis, by gastrointestinal administration. These health-promoting properties of XN can be interesting to the brewing community, concerning the production of XN-enriched beers.

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Chemical profile and antioxidant activity of *Halopteris filicina* macroalgae

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The brown algae *Halopteris filicina* has been revealing some pharmacological interest, due to its antimicrobial and antitumor activities. In the present work the aqueous lyophilized extract of this species was studied regarding its volatiles constituents (by GC/MS, using HS-SPME), organic acids (by HPLC/UV) and phenolic compounds (by HPLC/DAD). Its antioxidant activity was also evaluated, against DPPH, superoxide and nitric oxide radicals.

Twenty five volatile compounds (comprising aldehydes, norisoprenoids, ketones, monoterpenes, esters, alcohols, aromatic hydrocarbons and alkanes) (Fig. 1) and 2 organic acids (oxalic and fumaric acid) were determined. No phenolic compound was noticed.

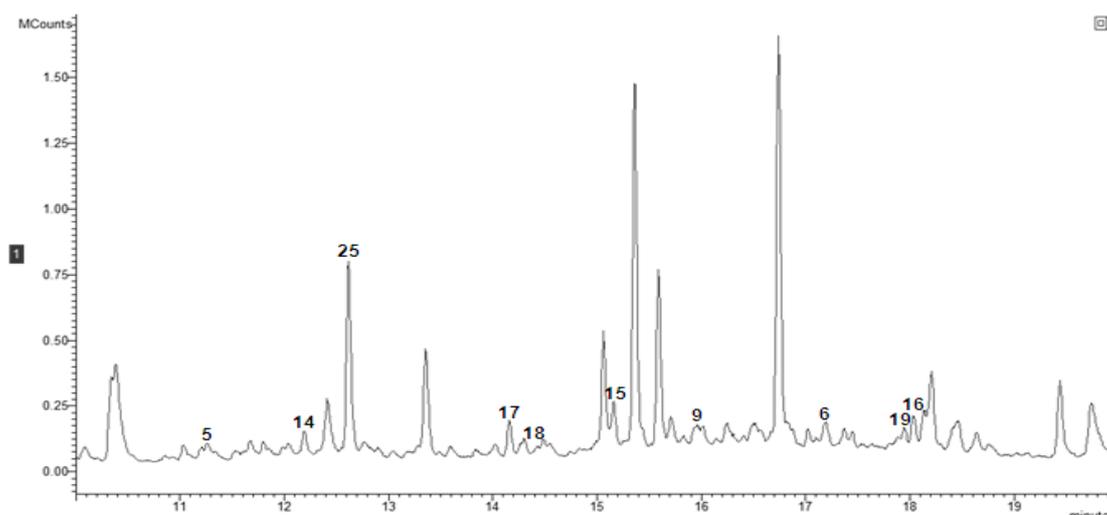


Fig. 1: GC/MS chromatogram of *H. filicina* aqueous lyophilized extract (10-20 min scan). (5) *trans*-2-octanal; (6) *trans*-2-decenal; (9) β -cyclocitral; (14) 2-nonanone; (15) 2-decanone; (16) 2-dodecanone; (17) *D*-isomenthone; (18) menthone; (19) menthyl acetate; (25) *trans*-2-nonenol.

The aqueous lyophilized extract of *H. filicina* revealed antioxidant capacity against superoxide ($IC_{25} = 69 \mu\text{g/ml}$) and nitric oxide ($IC_{25} = 72 \mu\text{g/ml}$) radicals only.

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Further perspectives to *Leucopaxillus giganteus* mycelium

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Wild edible mushrooms have attracted much attention, not only due to their nutritional value and pharmacological properties, such as antitumor and immunomodulating activity. *Leucopaxillus giganteus* is a wild edible species, commonly called giant funnel-shaped. It is a saprophytic and gregarious mushroom that lives often in rings, fields, and meadows at the edge of woodland, growing during summer or autumn for three weeks or less. For this study the mycelium produced *in vitro* was chosen, once this constitutes a rapid and simple way to obtain fungal biomass, allowing also the collection of fruiting bodies over the entire year. An aqueous extract was prepared and analysed regarding its chemical composition and antioxidant capacity.

Volatile components were characterized by HS-SPME/GC-MS and five compounds were identified: nonanal, 2-furfurylfuran (Fig. 1), *S*-carvone, 2-undecanone and *trans*-geranyl ketone.

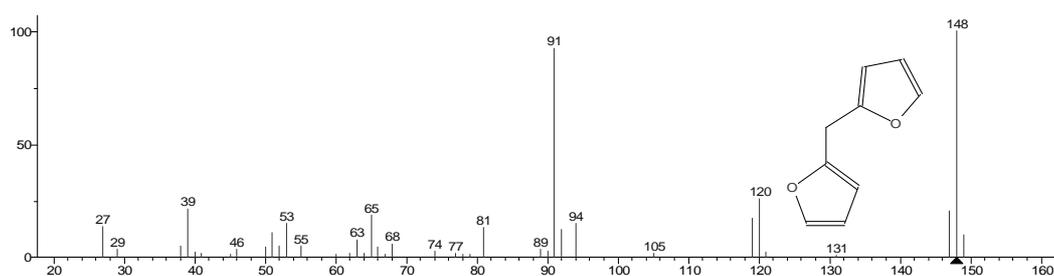


Fig. 1. MS spectra of 2-furfurylfuran found in the aqueous lyophilized extract of *Leucopaxillus giganteus* mycelium.

The organic acids present in the mycelium aqueous extract were determined by HPLC/UV, which enabled the identification of oxalic, ketoglutaric, quinic, shikimic and fumaric acids. Phenolics composition was also assessed by HPLC/DAD, but no compound was detected.

The antioxidant potential of the extract was tested against DPPH[•], superoxide (O₂^{•-}) and nitric oxide ([•]NO) radicals. A strong concentration-dependent protective effect was noticed against the three reactive species, pointing to the interest of this matrix as source of bioactive compounds.

Acknowledgments: To Fundação para a Ciência e Tecnologia for financial support (PTDC/AGR-AAM/64150/2006).

This work was developed within the optional curricular unit “Bioactivity of Natural Matrices” of the 5th year of the Master Degree in Pharmaceutical Sciences of the Faculty of Pharmacy, University of Oporto, under the responsibility of Paula Andrade and Patrícia Valentão.

Exploiting sea cucumber *Holothuria forskali*

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The important role of natural products in the discovery of bioactive compounds is evident in areas like cancer and infectious diseases. Pharmaceutical industry started to explore marine resources in order to find new lead compounds. This interest arises from the drastic conditions to which marine organisms are subjected, leading them to the development of efficient defense strategies. *Holothuria forskali*, known as black sea cucumber, is an echinoderm found from the surface up to 70 m depth, in the Atlantic Ocean and Mediterranean Sea.

In this work we proceeded to the identification of the phenolic compounds, organic acids and volatile components of the aqueous lyophilized extract of *H. forskali* by HPLC-DAD, HPLC-UV and HS-SPME/GC-MS, respectively. No phenolic compound was detected and oxalic acid was the only identified organic acid, being present in considerable amounts. In what concerns to volatiles, 24 compounds were determined, representing several chemical classes, being alcohols, ketones and monoterpenes the most representative ones.

Its antioxidant capacity was assessed against DPPH radical and against a reactive oxygen (superoxide radical) and a reactive nitrogen (nitric oxide) species. A concentration-dependent protective effect was observed just for the last two reactive species (Fig.1). The determined compounds, most certainly, contribute for the overall scavenging ability of this marine macro invertebrate.

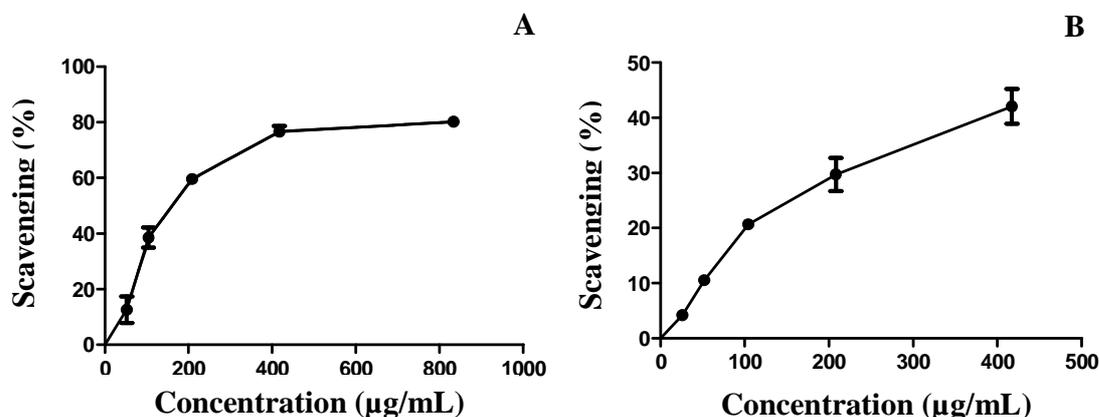


Fig. 1. Effect of *H. forskali* aqueous extract against (A) superoxide radical and (B) nitric oxide. Results show mean \pm standard error of three determinations.

Acknowledgments: To Fundação para a Ciência e Tecnologia for financial support (PTDC/AGR-AAM/64150/2006).

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***Marthasterias glacialis*: from chemistry to bioactivity**

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Due to their evolutionary history and daily needs, marine organisms possess a higher molecular diversity than terrestrial ones. Some chemical and structural characteristics are not even noticed in terrestrial species, which increases the possibility of finding bioactive compounds among marine life. *Marthasterias glacialis* is an echinoderm present in a wide variety of marine habitats, being found from Guinea Gulf and Mediterranean Sea till Scandinavian coast. This species is known for its carotenoids and steroidal saponins. In this work the aqueous extract was studied concerning its chemical characterization and antioxidant potential.

HS-SPME/GC-MS study provided the determination of 2-bromo-4,6-dimethylbenzamide (Fig. 1), limonene and 2-nonen-1-ol.

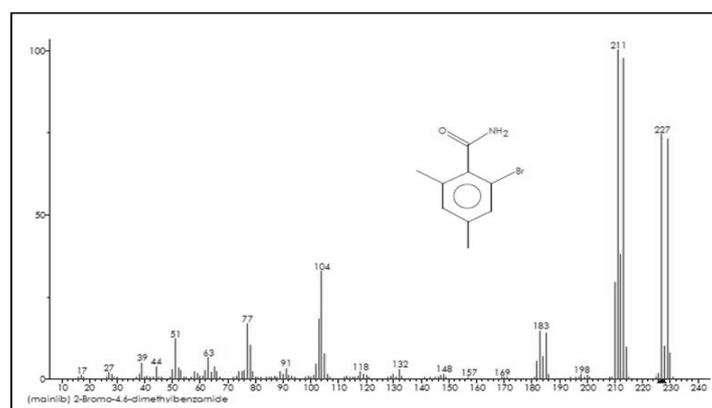


Fig. 1. MS spectra of brominated compound 2-bromo-4,6-dimethylbenzamide found in *M. glacialis*.

The HPLV-UV analysis revealed the presence of oxalic, ketoglutaric, pyruvic, malic, succinic and fumaric acids. Phenolic compounds were not found by HPLC-DAD analysis.

Regarding antioxidant potential, no activity was found against DPPH or nitric oxide radicals. However, the aqueous extract displayed a concentration-dependent effect against superoxide until 208 µg/mL (maximum activity, 61% scavenging), above which a pro-oxidant activity was noticed.

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Cytotoxicity effect of a 35% H₂O₂ bleaching gel on odontoblast cell line MDPC-23

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The aim of this study was to evaluate the trans-enamel and trans-dentinal cytotoxic effects of a 35% H₂O₂ bleaching gel on cultured odontoblast-like cell line (MDPC-23) after consecutive applications. Fifteen enamel/dentin discs were obtained from bovine central incisors and placed individually in artificial pulp chambers. Three groups (n=5) were formed according to the following enamel treatments: G1: 35% H₂O₂ bleaching gel (15 min); G2: 35% H₂O₂ bleaching gel (15 min) + halogen light (20 s); G3: control (no treatment). After repeating the treatments 3 consecutive times, the extracts (culture medium + components released from the bleaching gel) in contact with the dentin were collected and applied on previously cultured MDPC-23 cells (50,000 cells/cm²) for 24 h. Cell metabolism was evaluated by the MTT assay and the data were analyzed statistically ($\alpha=5\%$; Kruskal-Wallis and Mann-Whitney U test) (Fig. 1). Cell morphology was analyzed by scanning electron microscopy. Cell metabolism decreased by 92.03% and 82.47% in G1 and G2, respectively. G1 and G2 differed significantly ($P < 0.05$) from G3. Regardless of the association of halogen light activation, the application of the bleaching gel on the cultured odontoblast-like cells caused significantly more severe cytotoxic effects than those observed in the non-treated control group. In addition, significant morphological cell alterations were observed in G1 and G2. It was possible to conclude that after three consecutive applications of a 35% H₂O₂ bleaching agent, the diffusion of the gel components through enamel and dentin caused severe toxic effects to cultured pulp cells.

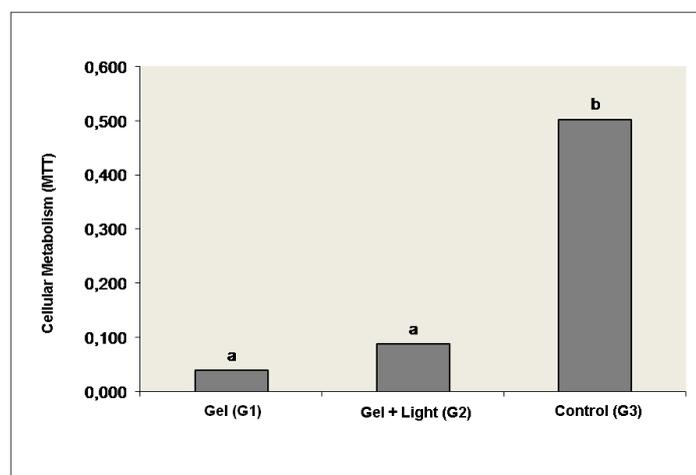


Fig. 1: Box-whisker plot (minimum lower quartile-median-upper quartile maximum) of the cell metabolism (MTT assay) results for each group (n=6). Groups identified with the same letter do not differ statistically (Mann-Whitney; $p > 0.05$).

Naphthoquinones from *Diospyros chamaethamnus*: Bioactivity in different cells lines

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Several naphthoquinones were isolated from root barks of *Diospyros chamaethamnus* (Ebenaceae) [1]. Naphthoquinones often appear as dimers, trimers and, more seldom, as tetramers. They present a very interesting spectrum of biological actions, including antibiotic, antiviral, anti-inflammatory, antipyretic, antiproliferative and cytotoxic effects [2]. The bioactivity of three naphthoquinones (naphthazarin, diospyrin and plumbagin) (Fig. 1) found in *D. chamaethamnus* was evaluated in two cell lines.

The 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazoliumbromide (MTT) assay was used to measure the viability of RAW 264.7 macrophages exposed to naphthazarin in the concentration range of 0.84 to 10.5 μM . The anti-inflammatory potential of this naphthoquinone in RAW 264.7 cells exposed to LPS was also evaluated by measuring nitric oxide production. In this assay dexamethasone was used as a positive control. In terms of viability, naphthazarin was cytotoxic for RAW 264.7 cells for the highest tested concentration. Below this concentration no anti-inflammatory activity was observed.

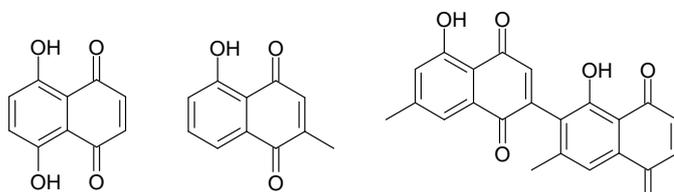


Fig. 1. Naphthoquinones isolated from root barks of *Diospyros chamaethamnus*. (A) naphthazarin, (B) plumbagin and (C) diospyrin.

Plumbagin and diospyrin were screened for their cytotoxic effect against the cancer cell line RBL-2H3 (rat basophilic leukemia). The MTT assay was used and an IC_{50} of 15.9 and 184.3 μM was found for plumbagin and diospyrin, respectively.

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Aknowledgements

B. Pinho (SFRH/BD/63852/2009), D. M. Pereira (SFRH/BD/62663/2009) and L. Gaspar (BII) are indebted to Fundação para a Ciência e a Tecnologia (FCT) for their grants.

Hydroxyxanthenes: Recent Progress in Synthetic Methodologies

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Xanthonic derivatives have prompted a great deal of interest due to their wide range of biological and pharmacological activities, such as antibacterial, antioxidant and antitumor, among others [1]. Our research group has a vast experience in synthesis of these bioactive molecules by classic ways, as well as in the study of their biological activities, especially antitumor [2-4]. In this context, we have investigated the effect of several hydroxy- and methoxyxanthenes on the *in vitro* growth of human tumor cell lines. Among the xanthenes tested, 1,3-dihydroxy-2-methylxanthone (**1**) and 1,3-dihydroxyxanthone (**2**) (**Fig. 1**) were found to be “hit” compounds [4,5]. For that reason, is fundamental to optimize synthetic methods to obtain these molecules.

Previously, we reported the synthesis of xanthenes **1** and **2** by three methodologies: by Grover, Shah and Shah (GSS) method through the condensation of salicylic acid and phloroglucinol derivatives, by the modified GSS reaction and also by using microwaves as heating source [3,4].

In the present work, a different approach to obtain these two hydroxyxanthenes was follow, applying Eaton’s reagent (P₂O₅/CH₃SO₃H) as the condensing agent [6].

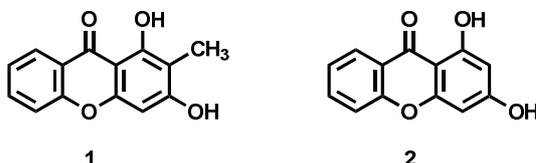


Figure 1: 1,3-dihydroxy-2-methylxanthone (**1**) and 1,3-dihydroxyxanthone (**2**)

Concerning xanthone **1**, although the use of Eaton’s reagent has led to a less time-consuming process, the classical GSS reaction is still the method of choice to obtain this xanthone in a higher yield. The same procedure was used to obtain compound **2**. In this case the yield was similar to the GSS reaction, but the main compound (**2**) was easier to purify because of the less number of by-products.

Acknowledgements: To CEQUIMED-UP (I&D 4040/2007) for financial support and to *Carlos M.G. Azevedo* for the fruitful scientific discussions.

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Perturbing effects of piroxicam on a model membrane system: role in its chemopreventive function

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Non Steroidal Anti-Inflammatory Drugs (NSAIDs) were originally developed to combat pain and inflammation. Renewed research interest has been generated for the past one decade to study these drugs in order to understand the mechanism behind their new and alternate functions. These alternate functions include chemoprevention and chemosuppression [1], protective effect against neurodegenerative disease like Alzheimer disease, etc [2]. In this regard several important functions have been attributed to the oxicam group of NSAIDs. It has been shown that one of the oxicam NSAIDs viz. piroxicam can permeabilize mitochondrial membrane [3] leading to the release of cytochrome C in cytosol, which activates pro-apoptotic caspase 3. As a possible mechanism behind permeabilization of mitochondrial membrane, it has been proposed that piroxicam can affect mitochondrial membrane biophysics leading to fusion and rupture.

According to the abovementioned, the focus of the work presented has been placed on the effects of piroxicam on membranes, and specifically the ability of this drug to bind to membrane phospholipids, as well as its effect on the lipid dynamic properties of membrane models, once the results may elucidate about the effects of this drug compromising the integrity of membranes. In order to identify and isolate the effect of different membrane parameters on the interaction of piroxicam, the biomimicry of the bilayer lipid membrane was achieved by the use of liposomes as membrane models. The effects on membrane biophysical properties elicited by the drug under study were evaluated by fluorescence techniques, namely fluorescence quenching and anisotropy measurements. Probes with distinct membrane location were used to label different depths of the bilayer and, therefore, anisotropy studies with these probes constitutes a relatively easy means of establishing the depth-dependence of fluidity, making also possible to determine the transition temperature of the lipids in different pH environments: at pH 7.4 (physiological pH) and pH 5 (typical of cancer and inflamed tissues). The most striking effect found was the location of the drug in both superficial and deeper portions of the membrane and a progressive shifting of its main transition temperature to lower values, with increasing piroxicam concentrations. This is possibly related with the capacity of this NSAID to deeply perturb the membrane biophysics.

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The role of drug-membrane interactions in the cardiovascular effects of β -blockers

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Membranes are the gathering place of many proteins and lipids, and are the structures where most cellular activities occur. Although drugs bind to proteins and regulate their activity, the membrane lipid phase is no less important. Great part of compounds studied induces structural changes in the lipid phase resulting structural defects, which in turn disturb membrane function and indirectly modulate membrane proteins.

This is also the case of β -blockers which seem to require strong hydrophobic interactions with the lipid bilayer in order to be effective as cardioprotective agents. The interactions of β -blockers with biological membranes, as well as with less complex liposome models, can be evaluated by various biophysical techniques to yield information regarding determinants of their pharmacological efficacy.

In the present study, the determination of liposome/water partition coefficient (K_p) by derivative spectrophotometry or spectrofluorimetry was the first step to evaluate the interaction of β -blockers (propranolol and acebutolol) with model membrane systems and permitted to compare the extent of membrane penetration and/or interaction of different β -blockers.

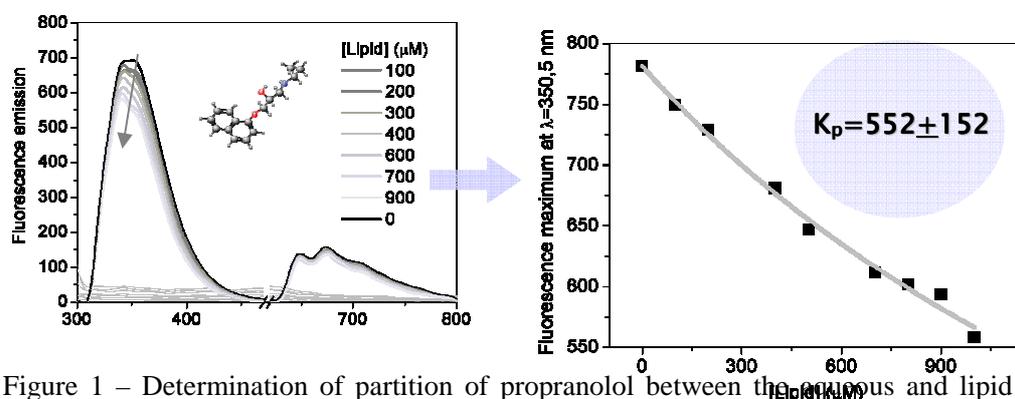


Figure 1 – Determination of partition of propranolol between the aqueous and lipid media (K_p) by spectrofluorimetry

Additionally, the drug location in the bilayer was studied with depth-dependent fluorescent probes (DPH and TMA-DPH), allowing assessment of quenching efficiency. Moreover, binding studies to the membrane surface were performed with the ANS fluorescent probe. Finally, zeta-potential measurements were made to evaluate changes in membrane surface resulting from the interaction with β -blockers and thus obtain more information about these drugs' binding behaviour, already gathered by the fluorescence techniques.

The experimental results obtained may provide more details about the interactions of β -blockers with biomembranes and can contribute to clarify the role of these interactions with respect to the β -blockers' antioxidant capability and potential therapeutic benefits.

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Effect of antitubercular drugs on membrane biophysics: implications for drugs mode of action

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Tuberculosis, one of the major diseases affecting human kind, is an infectious disease caused by *Mycobacterium tuberculosis* (MTB). The resurgence and continued persistence of tuberculosis in the developed world are well known public health concerns. Roughly one third of the human population is infected with MTB, and nearly two million people die each year as a result of this infection.

According to the abovementioned concerns about tuberculosis persistence and mortality, the prospect of finding newer and more effective drugs motivates the synthesis of new antibiotic molecules. However, as for other drugs, the pharmacological action of antibiotics to a large extent depends upon complex drug-phospholipid interactions. Furthermore, antibiotic-cell membrane interactions play a crucial role in understanding bioavailability of drugs, their entry into the cellular compartments and drug induced toxicity. Indeed, knowledge about the degree of penetration of drugs within membranes as well as the study of their ability to induce changes in physical characteristics of the membrane lipid bilayer is critical for understanding their activity specially if their therapeutic and toxic effects are strongly influenced by their lipid affinity, as in the case of antibiotics.

Regarding this, in the current work the effect of newly synthesized rifabutin analogs [1] on the membrane was investigated to evaluate the ability of these drugs to modify the membrane properties, based on their location. This was achieved using DMPC liposomes as membrane mimetic models, labeled with a fluorescent probes. Fluorescence quenching studies and lifetime measurements were made to study drugs location. Additionally fluorescence anisotropy measurements were made to investigate the effects of the drugs in membrane fluidity resulting from the interaction of the drugs and the membrane systems. Finally, since the partition coefficients (K_p) of pharmaceuticals are of utmost importance during the early stage of the drug design process, K_p were evaluated using a derivative spectrophotometric technique.

The overall results of the work presented reveal a deep interaction between the compounds studied and the lipid bilayer and permit to evaluate the drug lipophilicity which is a key factor to understand drug-receptor interactions.

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Synthesis of a pyranoxanthone: optimization by combining microwave assisted synthesis with heterogeneous catalysis

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A large number of naturally-occurring and synthetic xanthenes with interesting biological and pharmacological activities have been reported in the past few years, particularly as promising antitumor agents [1]. In our research group, the synthesis of xanthone derivatives with prenyl units, either in a ring format or as an open-chain, and their effect on the *in vitro* growth of some human tumor cell lines has been investigated [2,3]. Recently, the combination of microwave assisted synthesis with inorganic solid supports as catalysts, either with solvent or under solvent-free conditions, provided the synthesis of prenylated xanthenes with enhanced reaction rates and high yields [4].

In order to scale-up the synthesis of the most potent inhibitor, 3,4-dihydro-12-hydroxy-2,2-dimethyl-2*H*,6*H*pyrano[3,2-*b*]xanthen-6-one (**XP13**), a study comparing conventional heating and microwave assisted synthesis with the use of montmorillonite K10 as a catalyst was undertaken (Fig. 1).

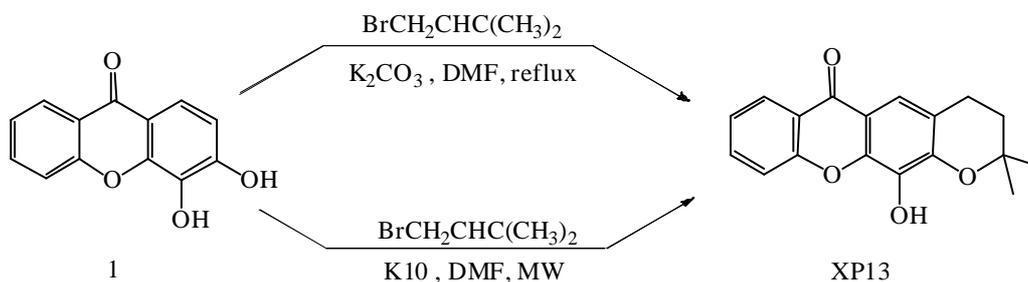


Fig. 1. XP13 synthesis by classical and microwave assisted routes.

Better yields were accomplished following a multimilligram approach by microwave-assisted synthesis of **XP13** from 3,4-dihydroxyxanthone (**1**).

[1] Pinto, M. M., Sousa, M. E., Nascimento, M. S. (2005) *Xanthone derivatives: new insights in biological activities*. *Curr. Med. Chem.*, 12, 2517-2538.

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Synthesis of xanthone derivatives with a promising antifungal activity

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Nowadays invasive mycoses have become important causes of morbidity and mortality in immunocompromised patients. Majority of clinically used antifungal drugs have suffered from various drawbacks in terms of toxicity, efficacy and cost, as well as the emergence of resistant strains caused by their frequent use [1]. This data led to the search for therapeutic alternatives among natural products and their synthetic derivatives. One interesting group of new antifungal agents is xanthenes (9*H*-xanthen-9-ones) which are heterocyclic compounds with the dibenzo- γ -pyrone scaffold. Some hydroxylated xanthenes were synthesised by our group and showed an inhibitory effect against *Microsporium gypseum* and *Trichophyton mentagrophytes* [2].

Due to these results an investigation to synthesize other xanthone derivatives has been pursued. A diversity of substituents like alkylamines and alcohols has been subjugated in reactions of nucleophilic substitution on a xanthonic isoster scaffold. Three known xanthone isosters were synthesized as illustrated in Fig. 1 by two methods (**a**,**b**) [3].

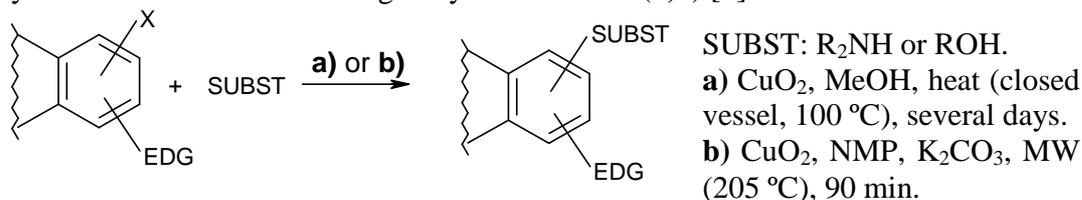


Fig. 1: Methods **a**) and **b**) to synthesize xanthenes isosters by nucleophilic reaction.

The scale-up to obtain these derivatives in grams was successfully when the electrophilicity of the substituents (SUBST) was high. In that case, applying method **a**) the derivatives were obtained in almost quantitative yields. In opposite, when the electrophilicity of the substituents (SUBST) was low, the scale-up was not accomplished and method **b**) was more successful in obtaining these derivatives.

In a near future, these xanthone derivatives will be investigated for their antifungal activity and genotoxicity.

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Synthesis, physico-chemical properties and biological activity of some derivatives of XP13, a xanthone with promising antitumoral activity

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Xanthenes are a group of *O*-heterocycle compounds which is well known for their important biological activities [1]. Our group has been focusing on the synthesis and biological activities of a collection of xanthone derivatives [2]. Moreover, to ensure good pharmacokinetic properties [3], a study of some physico-chemical properties should also be considered.

XP13 is a xanthone synthesized in our group which shows promising biological activities [4]. In order to obtain more active compounds with better bioavailability we intend to synthesize six analogues from three building blocks using different methods such as microwave assisted synthesis, metallic catalysis and solid phase synthesis. The lipophilicity, solubility and pKa will be evaluated for that compounds, The lipophilicity will be studied using the liposome/water model which is more accurate than octanol/water because take into account not only hydrophobic interactions but also electrostatic interactions [5]. The assessment of the solubility will be made at different pH and the pKa will be calculated by potentiometry and spectrophotometry using software program Hypersquad 2006. Afterwards, the evaluation of the growth inhibition of several tumor cell lines will be considered for those derivatives.

Actually, we have synthesized one building block and one of the analogues using Friedel-Crafts acylation, selective *O*-demethylation and metal catalyzed cyclization.

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A yeast model for LRRK2: biological studies and screening for small-molecule inhibitors

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Parkinson disease (PD) is the second most prevalent neurodegenerative disease among the elderly population. Recently, it was discovered that mutations in the *PARK8* locus, leucine-rich repeat kinase 2 (LRRK2), are the most common monogenetic cause of PD, responsible for 5-10% of the familial PD and also for a significant proportion of apparently sporadic cases [1]. The most frequent LRRK2 mutation associated with PD is G2019S. This mutation, found in the kinase domain, causes an increase in the kinase activity when compared with wild-type (wt) LRRK2 [2]. However, little is known about their regulation and physiological substrates. Furthermore, no pharmacological inhibitors of these proteins have been described so far.

Yeast has been successfully used as a simpler eukaryotic cell system in the study and high-throughput screening of small-molecule modulators of human proteins [3]. In order to understand the biology of wt and mutant (G2019S) LRRK2 and also to search for selective small-molecule inhibitors, human wt and mutant LRRK2 were individually expressed in the yeast *Saccharomyces cerevisiae*. The G2019S mutation was obtained by site-directed mutagenesis from wt LRRK2. High copy expression of human wt or mutant LRRK2 in yeast caused significant growth inhibition, more pronounced for the PD-causing mutant G2019S. Furthermore, wt and mutant LRRK2-mediated cytotoxicity was rescued in yeast cells without *ATG5*, an essential component of autophagy. This suggests the involvement of an autophagic pathway in wt and mutant LRRK2-mediated cytotoxicity. In order to study LRRK2 dynamics in yeast, wt and mutant LRRK2-EYFP fusions were further created. Both wt and mutant LRRK2 were predominantly found in large pericentriolar cytoplasmic aggregates. As a whole, this work represents the first attempt to express wt and mutant LRRK2 in yeast. The yeast system developed may help uncover basic aspects of both normal and pathogenic LRRK2 biology and may be further used as a first-line drug screening approach to search for selective pharmacological inhibitors with promising therapeutic applications in neurodegenerative disorders, such as PD.

We thank to REQUIMTE and to U.Porto/Santander Totta for financial support. C. Pereira is recipient of a fellowship from FCT (SFRH/BPD/44209/2008).

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Expression and activity evaluation of P-glycoprotein in human lymphocytes

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P-glycoprotein (P-gp) is a transmembrane protein which mediates the efflux of numerous drugs. This protein is constitutively expressed in various tissues of the organism, being also found in tumor cells where it seems to be related to multidrug resistance phenomenon (MDR).

This work consisted in the optimization and implementation of P-gp expression and activity determination techniques in whole blood isolated lymphocytes. 84 samples of lymphocytes obtained from 3 donor groups, distinguished by age (groups 1 - <30 years - n=34 and 2 - >50 years - n=31) and absence/presence of prostatic disease (group 2 - n=31 and group 3 - n=19, respectively) were analysed. P-gp expression was evaluated using the monoclonal antibody UIC2 in the presence of P-gp substrate vimblastine, which facilitates the detection of this protein by the antibody. Its activity was determined by means of UIC2 shift assay (in the presence and absence of vimblastine), and also measuring the efflux of P-gp fluorescent substrate (Ai/E), rodamine 123, after its accumulation in the presence of P-gp inhibitor cyclosporin A (Ai). Flow cytometric analysis was used to assess all the proceedings.

It was found a significant raise in P-gp expression in lymphocytes along with the increase in age (group 1 versus group 2), and a significant fall in P-gp expression in lymphocytes in the presence of prostatic disease, relative to healthy donors (groups 3 and 2, respectively). In what concerns to the transporter's activity in lymphocytes, it diminished significantly with the increase in age and the presence of prostatic disease. It was found a strong correlation between expression and activity of P-gp in group 1. For groups 2 and 3 this correlation diminished or disappeared. Both methods used to determine the activity of P-gp lead to similar conclusions.

In conclusion, it is recommended that the evaluation of P-gp expression in peripheral blood lymphocytes must not be the only parameter taken into account to perform the implementation of new therapeutic regimens. In fact, the significant decrease in the activity of lymphocytic P-gp with the increase in age and the presence of prostatic disease and, also, the poor correlation between expression and activity in the older groups, are important data to take into consideration when initiating systemic therapeutic with P-gp substrates, especially in men older than 50 years of age.

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Evaluation of bone regeneration in osteoporotic conditions

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Osteoporosis is characterized by a reduction in bone mass and disruption of bone architecture, resulting in increased bone fragility and fracture risk. These fractures are widely recognized as a major health problem in the elderly population. One in three women and one in five men surviving to the age of 80 years will suffer a hip fracture due to osteoporosis (1). Demographic changes over the next 50 years are predicted to lead to at least a doubling in the number of related fractures, largely as a result of increased longevity (1). Osteoporosis is of additional relevance in women entering the menopause due to the lack of estrogen production - associated with an anti-resorptive stimulus to the bone tissue. Hormonal disequilibrium is known to favour bone resorption, which in turn leads to skeletal fragility and increased risk of fracture (2). It is believed that one of the early and transient effects of estrogen deficiency is to increase the activity of osteoclasts, probably by suppressing apoptosis. Enlarged osteoclastic activity causes an increase in the depth of erosion of bone by these cells, contributing to the trabecular penetration and disruption of bone architecture that characterizes postmenopausal osteoporosis (3). Additionally, preliminary data reports that the bone regeneration process, in osteoporotic conditions, is somewhat limited mainly due to a decrease of new bone formation, nevertheless specific mechanisms have not been stated.

The aim of this study is to evaluate bone regeneration process in osteoporotic conditions, both in the presence and the absence of bone-regenerative biomaterials. This evaluation will be made in valid animal models - ovariectomized Wistar rats - of primary osteoporosis, which can mimic the systemic human condition. This model relies on the usual changes that bone tissue undergoes after ovariectomy.

The animals will be randomly divided into two groups: sham operation and ovariectomy group (Ovx). The animals of each group (sham and Ovx) will be assigned to 2 sub-groups: critical size defect and non critical size defect. Critical size defects of 5mm \emptyset will be created on the skull of Ovx and sham animals, previously to the placement of a commercial hydroxyapatite (Bio-Oss®), known to report adequate biocompatibility. Non critical size defects of 3mm \emptyset will be created on the skull of the Sham and Ovx group and left untreated to access the endochondral ossification process. Routine histological, immunohistochemical and radiographic evaluations will be conducted at adequate time points.

This work is expected to provide information regarding bone regeneration process, both in the presence and absence of biomaterials, in osteoporotic conditions.

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Mutation screening in routine lung cancer evaluation: a unique pattern of *TP53* somatic alterations in the Portuguese population?

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Lung cancer is the most frequent cause of cancer death worldwide, and its high mortality is a direct consequence of the lack of effective early diagnosis methods [1]. In theory, this need could be fulfilled through the routine use of DNA markers, which could also improve staging, recurrence detection and prognosis [2]. *TP53* has the potential to be one these markers, as it is the most frequently mutated gene in sporadic lung tumors [3,4].

As part of our plan to introduce *TP53* mutation screening into routine analysis of clinical samples, we searched multiple samples from a series of lung cancer patients for alterations in exons five to nine of *TP53*. Ten out of 72 patients (13,9%) presented at least one analysable sample with a somatic *TP53* alteration. The percentages of G>T (27,3%), G>C (10,5%) and A>T (6,2%) mutations were similar to those described in the International Agency for Research on Cancer (IARC)*TP53* Mutation Database (29%, 10,5% and 6,2%, respectively), whereas substantially different frequencies were observed for A>G (18,2% vs 10,9%) and G>A (9,1% vs 26,2%) mutations. Most interestingly, our study shows a higher frequency of *TP53* deletions than expected (27,3% vs 9,3%), including two deletions not previously described [3,4].

The *TP53* mutation pattern found in this study thus differs markedly from the expected one. This could reflect a peculiar combination of carcinogen exposures for the cohort here analyzed, or, alternatively, it might be indirect evidence of significant genetic differences between the Portuguese population and the (more global) population covered in the studies compiled in the IARC *TP53* Mutation Database [3,4].

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Clonal diversity of *Acinetobacter baumannii* population carrying carbapenem-hydrolyzing oxacillinases in Portuguese hospitals

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Acinetobacter baumannii is a gram-negative organism that is increasingly recognized as a major pathogen causing nosocomial infections. Increasing resistance to carbapenems has been observed worldwide in the past decade, frequently mediated by production of class D β -lactamases with carbapenemase activity: OXA-23, OXA-40, and OXA-58 groups. They were all detected in Portugal, but their prevalence in Portuguese hospitals changed over time: since 1998 to 2001 *bla*OXA-40 pulsotype prevailed, between 2001 and 2004 the *bla*OXA-58 pulsotype was the dominant, being replaced until 2006 by the OXA-40 producer clone. After 2006 we observed an increase in the appearance of OXA-23-producers. Together they greatly contributed to the high rate of imipenem-resistance in this species in Portuguese hospitals. The aim of this work was to investigate the clonal relationship between *bla*OXA-23, *bla*OXA-58 and *bla*OXA-40-carrying isolates by an MLST scheme, a new epidemiology tool were the internal portions of 7 housekeeping genes (*gltA*, *gyrB*, *gdhB*, *recA*, *cpn60*, *gpi*, and *rpoD*) are amplified, sequenced and analyzed using the *Acinetobacter baumannii* MLST database website (<http://pubmlst.org/abaumannii/>).

We analysed the population structure of ten isolates representative of *bla*OXA-23 (n=4), *bla*OXA-40 (n=3) and *bla*OXA-58 (n=2) carrying strains, disseminated and persisting over years, that were selected among well characterized 324 AB isolates recovered from 5 Portuguese hospitals. A carbapenem-susceptible isolate (CSAB) was also included. Isolates were identified by API32GN and by 16S rRNA sequencing. Susceptibility testing was performed according to CLSI standard procedures. *bla*OXA-23, *bla*OXA-40, and *bla*OXA-58 genes were identified by sequencing of respective amplicons. MLST scheme was performed according to Bartual et al (2005).

MLST typing revealed that both *bla*OXA-23-carrying AB and CSAB belonged to the disseminated ST22. The OXA-40-producing AB isolates corresponded to a new ST-ST33, which is a double locus variant of ST22. The *bla*OXA-58 carrying isolates clustered in the ST38, already detected in Argentina but not related with the STs 22 and 33.

In our country, carbapenem-resistant AB are mainly related to the dissemination of three different STs, and curiously each one is associated to a different acquired OXA-type. The rapid increase in the recently described OXA-23 producers is associated with the spread of the worldwide disseminated ST22 AB clone. Remarkably, MLST data indicates a common origin between ST22 and the ST 33 OXA-40-producing clone.

Fungal secondary metabolites as potencial growth inhibitory agents in tumor cell lines

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There is a growing need to develop more specific agents to treat several types of cancers, particularly chemoresistant [1]. Interestingly, approximately 50% of the drugs used in therapeutics are derived from Natural Products [2]. In particular, compounds with unique scaffolds have been discovered in almost all classes of marine organisms, including fungi. The biological evaluation of marine-derived extracts and pure compounds isolated from those extracts is an essential task for drug development [3, 4]. In fact, marine species are among the most promising sources of new molecules with biological activity, including antitumor substances [5] in preclinical or clinical phases [6]. The aim of this project is to carry out the isolation, purification and structure elucidation of secondary metabolites from fungi, as well as screening for their activity as inhibitors of the growth of human tumour cell lines.

The isolation of some compounds from the marine fungi *Eurotium cristatum* from the Gulf of Thailand has been accomplished using fractionation by column chromatography (silica gel/sephadex) followed by thin layer chromatography and their structures will be elucidated by spectroscopic methods especially high field NMR (COSY, HSQC, HMBC, NOESY) and mass spectrometry. These compounds will be evaluated for their *in vitro* capacity to inhibit the growth of three human tumour cell lines, according to the procedure adopted in the NCI *in vitro* anticancer drug screening [7]. Finally, the most active compounds will be evaluated for their possible mechanism of action, particularly regarding apoptotic inducing effect, in one of the human tumour cell lines.

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Characterization and nutritional modulation of glucose uptake in human breast cancer cells.

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When compared with normal differentiated cells, tumor cells have a higher demand of glucose that supports enhanced cell growth and survival [1]. Several plant polyphenols are known to possess anti-oxidant, anti-inflammatory and anti-proliferative properties [2]. Recent work from our group have demonstrated that the polyphenols quercetin (QUE) and epigallocatechin 3-galate (EGCG) inhibit glucose uptake by placental cells [3]. The aim of this work is to characterize glucose uptake in the breast cancer cell line MCF-7, and to investigate its modulation by QUE and EGCG. For this, we studied ³H-2-deoxy-D-glucose (³H-DG) uptake by MCF-7 cells and tested short (26 min) and prolonged (4 h) effects of these polyphenols upon ³H-DG uptake. Our results show that ³H-DG uptake by MCF-7 cells is: a) time-dependent, b) saturable, c) insulin and sodium independent and d) inhibited by the GLUT inhibitor cytochalasin B. In addition, ³H-DG uptake by MCF-7 cells is shown to be potently inhibited by short-term (26 min) exposure to QUE and EGCG in a concentration-dependent manner. These inhibitory effects seem to be lost when the exposure time is prolonged to 4h. We can conclude that ³H-DG uptake by MCF-7 cells is mediated by members of the glucose transporter family (GLUT) (but not by the insulin-responsive GLUT4), the sodium dependent glucose transporter (SGLT1) being not involved. Moreover, we demonstrate that QUE and EGCG potently impair ³H-DG uptake by this cancer cell line. In the near future we will determine the nature of the inhibitory effect of both polyphenols. We will also prolong further the time of exposure of the cells to QUE and EGCG and test the impact of this on ³H-DG uptake, GLUT gene expression, and on MCF-7 cell viability, apoptosis and proliferation.

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Thermal and textural analysis of human and *Bos grunniens* hair

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In this work, six different hair samples were analyzed with differential scanning calorimetry (DSC) and textural analysis in order to understand if these methods are suitable for the analysis of hair samples. The samples were virgin human hair, virgin, bleached and coloured *Bos grunniens* hair.

Thermal analysis was conducted from 30°C to 500°C, under an air flow rate of 40 mL min⁻¹ and at a heating rate of 10 K min⁻¹ (DSC 200 F3 Maia® - NETZSCH - Gerätebau GmbH). Single hair fibers were tested in a Texturometer (TAXT2i, Stable Micro Systems, UK). The test speed was 0.5 mm/s and the extent of deformation was 40 mm. Ten measurements were performed for each sample.

DSC studies can be used to investigate the melting behaviour of the crystallites in keratinous fibres. When human hair fibers are stretched, X-ray diffraction shows that the α -form crystallites transform into β -form crystallites [1]. This process is called α - β transition. In this study, three phases were observed with DSC (Figure 1 - a): an initial broad endotherm from 40°C to 120°C due to moisture evaporation; an endotherm with a peak temperature of 237°C, presumably corresponding to the melting of the α form in hair, and finally a broad exotherm which could be the result of the sample thermal degradation/pyrolysis [1]. The texturograms obtained with the tested hair samples, presented three different regions (Figure 1 - b). The portion A-B often called the “Hookean region” [2] is approximately linear. Between 2-4% of strain the curve turns over into the yield region (B-C). In this region very little increase in force is required to increase extension. In the post field region (C-D), which typically begins between 25-30% deformation, the force increases markedly with strain until finally occurs the rupture of the hair fiber.

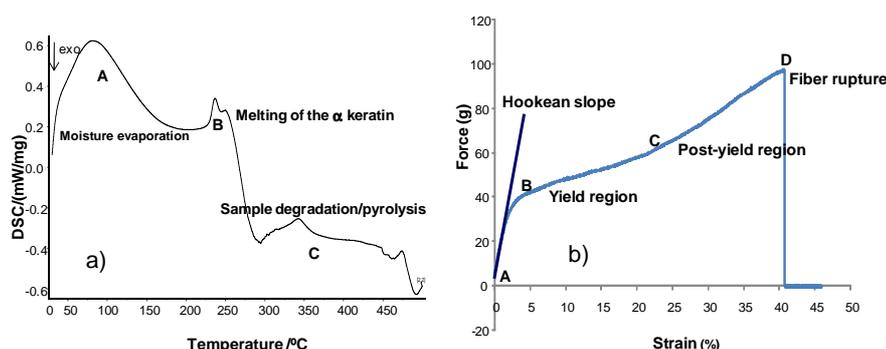


Figure 1 - a) DSC curve and b) Stress/strain curve for hair sample.

We found that both methodologies allowed the characterization of different hair samples

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***In silico* screening of small molecules targeting EBV**

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Epstein Barr Virus (EBV) is a gammaherpesvirus and is one of the most common viruses in humans. EBV infections are often asymptomatic but this virus may be associated to carcinoma in immunocompetent patients and to severe diseases in immunocompromised patients [1]. The virus exists in different phases during its life cycle, known as latent and lytic phase, in which it expresses different sets of genes. There are few drugs licensed for the treatment of EBV infections, but since they are only active in the lytic phase of the viral infection they have been used with limited impact, except when used together with drugs that induce EBV lytic cycle. Thus, there is a crucial need for new antiviral drugs namely drugs active on the latent EBV. Recently, significant efforts have been made to set up a range of strategies for the identification of potential new antiviral drugs [2]. *In silico* (or virtual) screening is now a common practice in current computer-aided drug design. Indeed, there are a number of drugs whose development was heavily influenced by or based on this strategy, namely HIV protease inhibitors [3].

In this work we describe an *in silico* screening EBV target-based. The workflow consisted on the following stages: (i) Target selection and preparation; (ii) Preparation of a screening library; (iii) Binding mode selection; (iv) Docking and (v) Scoring using eHiTS (electronic High Throughput Screening) from SimBioSys Inc [4]. This workflow was applied to the virtual screening of a library of molecules obtained by CEQUIMED-UP, as well as hundreds of virtual molecules that would be easily synthesised. Compounds were docked into five crystal structures from three targets of EBV collected from PDB data bank, namely the latent protein - EBV nuclear antigen 1 or EBNA-1 (*Ib3t* and *Ivhi*), the immediate early lytic protein - Zebra (*2c9l* and *2c9n*) and the early lytic protein, BHRF1 (*Iq59*). The conformations of top scoring molecules were examined to consider which molecules would be best for further optimization. This work will be followed by *in vitro* testing in an EBV positive Burkitt Lymphoma cell line, in order to confirm the anti-EBV activity of the selected compounds.

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Woman in the Politic: An Analyse of the Legislativ in Porto Alegre, RS – Brazil

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Political representation and the issue of gender parity in Brazilian contemporary democratic society are the core of this research. We focus specifically on the lack of women in elected office of the legislature and adopt the theory of Recognition and Gender Justice Nancy Fraser to think about not existing parity in Brazil in the legislative arenas with respect to the predominance of men in them. How objective of the work we intend to verify the path of the previous policy (as) agents (as) in search of similarities and / or peculiarities before his first election.

Brazilian society is marked and labeled as a society are predominant in cronyism and has strongly patriarchal tradition, a factor that is identified as one of the reasons why it is difficult for women to occupy spaces for real participation. Women elected in Brazil today show some interesting features to be highlighted. Most of the legislators opted for a profession to the area of human that could be an indicator that the “women of the politic” have traditionally been identified as female occupations. Prior to participation in the political field, that is, before elected to office in the Legislature, participated in the public sphere, for example, working in social movements - unions, student movements, among others, that is, worked in social organizations they public projects. A history marked by strong participation in the public sphere can be considered an explanatory factor when we realize that women were elected in the first application and therefore we can say that taking the legislative arena, for women, is preceded by the occupation and through effective participation in the public sphere, which leads us to believe that the party takes place bets only when the woman is seen as having some capital that you become a potential candidate to vote (Pinto, 2000, pp. 30).

Some women are elected and participate in the arena of institutionalized power. However, the percentage of women in Congress - the traditional space of power, considered male - are still low and can not be held to be a relationship between peers when it comes to race equality. We believed that the political trajectory is a factor that should be considered, because the visibility that the seizure of public space provides is important for applications from women.

But beyond this fact, which causes us concern is to scrutinize the relationship between gender and political representation. To what extent the political arena is still a male social space? Our hypothesis is that the trajectory public prior to the election is crucial for the achievement of public office.

Our methodological option seeks a quantitative and qualitative approach, with questionnaires - whose information will be the basis of a database in SPSS - with the parliamentarians elected in the years 2006 and 2008 in Porto Alegre and in Rio Grande do Sul.

The elected women in Brazil today show some interesting features: most of the legislators opted for a profession to the area of humanities (traditionally identified as female occupations) and participated in the public sphere before his first election.

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Cyberculture, Democracy and Political Culture: a compared analysis of North-american electoral rules against “phenomenon Obama” and Brazil’s new legal reforms.

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The Information and Communication Technologies (ITC’s) has been developing and improving its influences in a fast scale by the recent decades. In a context of a Digital Era, third era as Wilson Gomes¹ asserts, it can be observed a constitution of a Cyberspace, as exposes Pierre Lévy², which, as ones of its main consequent provisions, Cyberculture and Collective Intelligence (aspect related to a community cognitive and performance upgrowth in a multi-dimension) play special roles against “information society”, and, mainly, against a new form of Governance proceeding and State acting.

Submerged by this context, in all its complexity, the development of new ITC’s democratizing potential can be deeply observed, and a possible ability of a “Democracy revitalize”, in a beneficial axiological and principiologic character, is increasingly defended and sought by collective, that experience, currently, a “Democracy crisis”, specially its representative institute. Although, in despite of some optimistic and non-basis factual formulations, do in fact the Internet contains, with its technological formulations, strong and special ability able to revitalize Democracy and its institutions? Do Cyberdemocracy really gives rise to the fostering of citizens political participation in a Habermas public sphere of citizen/state (direct) greater integration? Do it possibilities an expanded access to informations, and even the possibility of “experiencing Democracy” under what John Dewey stressed as its strongest sense (Democracy analised as with a cooperative nature and deeply linked to social netweaving)?

As questions of this work, this paper examines the real and effective possibility of the Cyberdemocracy affirmation by the Cyberculture use (Internet and social netweaving) on North (USA) and South America (Brazil) recent electoral politics campaigns. In this sense, seeks to establish the possible fostering of a new political culture through the organization of this campaigns measured by Cyberculture (social capillarity that permeates the new technologies) are also promoted, as social-political contexts constitute main aspects of influence on Cyberdemocracy configuration, and even gap’s between digital democracy discourse and practice.

By review of government agencies and non-governmental organizations data, and mainly electoral legal rules within USA and Brazil, it was compared qualitative empirical analysis with theoretical insights grounded on Coleman, Gutmann & Thompson, Dryzer, Andre Lemos and Wilson Gomes, so "Obama phenomenon" (USA), as well as the Brazilian latest electoral reforms (concerning digital culture issues), would be understood against ICT’s, especially Internet, and its possible capacity of Cyberdemocracy development, as well as a more participatory and integrative new political culture enhancement.

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Introduction to *MAXIMA* Software

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Free software is, according to the definition established by the Free Foundation, any computer program that can be installed, operated and distributed without restriction. An example of free software is *Maxima*.

Maxima is a system derived from Macsyma, the legendary computer algebra system developed between 1968 and 1982 at Massachusetts Institute of Technology. It allows symbolic and numerical calculations, graphical programming and make holding a variety of commands for different purposes in Mathematics, thus becoming a good alternative to commercial similar software such as *Maple* or *Mathematica*.

Due to limited existing literature about the use and application of this software, in particular in the Portuguese language, came this study and consequently the book [4]. This work is useful for those who want to begin to use *Maxima* in Mathematics, including Algebra, Calculus, Numerical Analysis and Probability and Statistics either in interactive and programming aspects.

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Production of high quality $Gd_5Si_2Ge_2$ and Er_5Si_4 magnetocaloric compounds

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Nowadays the research on Magnetorefrigeration systems, based on the materials showing magnetocaloric effect (MCE) is one of the hottest topics within the scientific community. The magnetocaloric effect consists basically on a temperature change of a material upon the application of a magnetic field.

From the several materials that show MCE, the $R_5(Si_{1-x}Ge_x)_4$ family is one of the promising, particularly that based on $Gd_5(Si_{0.5}Ge_{0.5})_4$ [1]. They present a large MCE arising from the occurrence of a magnetostructural transition between two crystallographic phases: Monoclinic (M) to Orthorhombic (O(I)), coupled with a magnetic transition from a paramagnetic phase to a ferromagnetic one. The possibility of inducing this transition both by controlling the temperature and by applying a magnetic field makes it a very promising material for new technologies.

Nevertheless the production of good quality $Gd_5(Si_{0.5}Ge_{0.5})_4$ compounds is particularly difficult because of the strong dependence on the: purity of Gd and due to the fact that this exact stoichiometry composition is in narrow regions of the metallurgical phases diagrams (Gd-Si and Gd-Ge). Furthermore, in the phase diagram of $Gd_5(Si_{1-x}Ge_x)_4$ this compound is in the critical intersection of two different phases (O(I) and M phases) that makes the achievement of 100% of the desirable phase (responsible for the giant MCE) complex [2]. Similarly, the achievement of the Er_5Si_4 compound in the O(I) phase at room temperature is equally challenging. This compound presents a fully decoupled magnetic and structural transition and is therefore crucial for the understanding of the transitions origins.

Herein, we performed a systematic thermal treatments on these compounds ($Gd_5(Si_{0.5}Ge_{0.5})_4$ and Er_5Si_4), by controlling the annealing temperature, time, and the respective quenching rates. These samples were characterized by X-ray Diffraction using Le Bail refinement to determine the amount of the desired phase. Furthermore, a detailed magnetometer and Linear Thermal Expansion study will be done to fully characterize the magnetic and structural transitions. The aim of this work is to optimize conditions in order to produce high quality compounds that manifest such important properties for technology applications.

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Study of ionospheric anomalies using the GPS-TEC technique

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The ionosphere is the region of the upper atmosphere where the electronic and ionic concentrations are sufficiently high to interact with electromagnetic fields. The ionospheric plasma interacts with the Earth's magnetic field and, to a certain extent, is controlled by it. The monitoring of the ionospheric dynamic structure is thus of natural importance for the study of the effect of solar wind activity on magnetic storms and of seismically induced electromagnetic emission phenomena [1].

The Global Positioning System (GPS) consists of 24 satellites, evenly distributed in 6 orbital planes around the globe at an altitude ≈ 20200 km. Each satellite transmits signals on two frequencies ($f_1 = 1575.42$ MHz and $f_2 = 1227.60$ MHz) with two different codes, P1 (or C/A) and P2 and two different carrier phases, L1 and L2. Since the ionosphere is a dispersive medium, the speed of propagation of the electromagnetic waves transmitted by the GPS satellites depends on the frequency of radio waves. The carrier phase advance and group delay of GPS transmitted radio waves in the ionosphere is proportional to electron content integrated along the propagation path, which is known as TEC. According to the GPS-TEC technique [2], one can derive TEC by comparing the phase delays of the L1 and L2 signals. Since the ionosphere is a dispersive medium, it is possible to evaluate the ionospheric effect by measuring modulations on carrier phases and phase codes recorded by dual-frequency receivers. TEC measurements provide two-dimensional cross-section maps of the ionosphere's electron density on a regional or global scale.

This project aims at the monitoring of the ionospheric total electron content using the GPS-TEC technique. Special emphasis will be given to the application of GPS-TEC for the detection of ionospheric TEC anomalies associated with seismically induced electromagnetic emission phenomena. The project will also contemplate the assessment of an eventual use of the portuguese GPS ground station network for such regional ionospheric studies.

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Laboratorial study of space weathering effects on meteorites samples

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Meteorites are remnants of geologic processes that occurred in our Solar System. Properly analysed, the bulk composition, mineralogy, and petrology of meteorites can be used to constrain planet formation processes [1]. The most common components of asteroid surface materials that can be identified remotely include pyroxene, olivine, phyllosilicates, organic material, and opaques (particularly metallic iron, graphite, troilite, and magnetite). The combinations of these minerals on any particular asteroid surface reflect the formation and post-formation processing to which the asteroid has been subjected [2]. It is now widely accepted that irradiation by cosmic rays and solar wind ions, as well as bombardment by interplanetary dust particles (micro-meteorites), induces surface modifications on airless bodies of the Solar System. Such processes, known as space weathering, affect the spectral properties of silicate-rich objects, inducing progressive darkening and reddening of the solar reflectance spectra in the UV-VIS-NIR range (0.2 – 2.7 μm) [3]. It has been suggested that space weathering can be responsible for the puzzling mismatch between the spectra of OCs and the surface spectra of their presumed (S type) asteroidal parent bodies [4].

In the interpretation of asteroid spectra, an important role is played by laboratory experiments that simulate the space weathering processes and the corresponding spectral variations. In this work we have performed a compositional characterization of three meteorite samples recovered in Morocco, named as A, B and C, using reflection spectroscopy, X-ray Powder Diffraction (XRD), Scanning Electron Microscopy (SEM) and mineralogical observation with polarized light microscope. From the obtained results, they were classified as belonging to the classes of the stony-iron meteorites (A and B) and metallic meteorites (C). The reflectance spectrum of the sample A (LA2) shows a good correlation with 6 meteorites present in the RELAB database (Reflectance Experiment Laboratory database) but the major correlation was found with a meteorite named as Hamlet belonging to the class of the stony meteorites. We have also simulated space weathering effects by irradiating the meteorite samples with Ultraviolet radiation. The reflectance spectra of weathered samples confirm the predicted changes.

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Hydration knowledge and behaviour and impact of fluids intake on skill performance of elite adolescent basketball players

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To determine the hydration knowledge and behavior and impact of fluids intake on basketball performance, twelve adolescent players underwent, in a cross-over design study, three separate 90 minute training sessions in the following conditions: no fluid ingestion allowed (**NF**), *ad libitum* ingestion of water (**W**), and *ad libitum* ingestion of a commercial 8% carbohydrate-electrolyte sports beverage (**CSB**). After each session subjects performed a set of basketball drills (2-point, 3-point and free-throw shootout, suicide sprints and defensive zigzags). Body weight (before and after sessions), rate of perceived exertion (**RPE**), urine color and beverage acceptability were determined in each session. Athletes also completed a survey about their knowledge and behaviors regarding hydration and fluid replacement. The percentage of weight loss was significantly higher in NF ($2.46\% \pm 0.87$) compared with other two conditions (W: $1.08\% \pm 0.67$, $P = 0.006$; CSB: $0.65\% \pm 0.62$, $P = 0.001$), but also in W vs. CSB condition ($P = 0.012$). RPE was higher in NF (16.8 ± 1.96) compared with W (14.2 ± 1.99 ; $P = 0.004$) and CSB (13.3 ± 2.06 ; $P = 0.002$) trials. No significant differences were observed in basketball performance and other variables. Athletes' fluid intake was positively correlated with self-reported behaviors ($r = 0.75$; $P = 0.005$) and knowledge ($r = 0.76$; $P = 0.004$) about fluid and hydration.

Fluid restriction didn't impaired performance but increase athletes' perceived exertion and body mass lost. Athletes' with more knowledge about hydration issues had better self-reported behaviors and ingested more fluids during training sessions.

Preliminary validation of attacking scenarios to evaluate perceptual-cognitive expertise of soccer players

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In situational or strategic sports, such as soccer, players have to carry out fast and accurate decisions in a complex and variable environment. These decisions elapses from information coming from different sources,(i.e., the ball, the other players) and the decision-making process takes place under pressure with opponents trying to restrict the “time” and “space” available.

In the present work, the validation of several attacking sequences trials used to support perceptual-cognitive studying was reported.

Elite Portuguese soccer coaches (n = 4, UEFA-A) were presented with separate test film sequences contained structured attacking soccer actions. In the experiment 41 offensive clips were viewed to ensure that they were representative of a typical attacking experienced during a match or not. To edit the film into 41 different clips we used the Pinnacle software, *Avid Liquid* edition 7 (see Fig. 1). Each clip has approximately seven seconds long with an inter-trial interval of five seconds, and to help the participants to the viewing process, just before the start of each clip a small circle surrounding the ball it is shown on screen to indicate the area of its first appearance. The order of presentation of video clips was counterbalanced and randomly determined.



Fig. 1- A frame from the structured trial presented in video.

Both, Cronbach’s Alpha and Intraclass Correlation Coefficient were representative of a total inter-observer agreement (0.889) between them. Even the Kendall’s tau_b correlation value was significant ($p < 0.01$).

The entire footage could be used in research that required knowing the tactical awareness of soccer players.

Keywords: Offensive Game Patterns, Validation, Expertise, Soccer

Bone mineral density and bone mineral content in children and adolescents boys. Effects of age, maturation status and sport participation.

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Introduction: Osteoporosis is a disease characterized by fragility of bone mass, which in turn increases susceptibility of fractures [1]. Maximizing the bone mass accrual is one of the determinants of the quality of bone mass and a prevention factor of osteoporosis in the adulthood [2]. Better understanding about the factors that influence the gain of bone mass in childhood and adolescence, may help develop strategies to maximize the deposition of bone mass during childhood and adolescence, which in turn can help prevent osteoporotic fractures that occur in the adulthood.

Objective: (1) Describe the bone mineral content (BMC), bone mineral density (BMD) and bone area (BA) in children and adolescents male Portuguese. (2) Determine the association of age, maturational status and physical activity with BMC, BMD and BA.

Methods: The sample consisted of 230 children and youngmales, aged between 12 and 18 years (136 physically active and 94 non-active). We evaluated the weight and height, body mass index (BMI) and Tanner stage of maturation. The bone variables were evaluated in lumbar spine (L1-L4) by Dual-energy X-ray Absorptiometry (DXA). We used the descriptive statistics, analysis of variance with two factors and multiple regression.

Results: (1)The values of BMC, BMD and BA increased with age ($p<0.001$) and maturational status ($p<0.001$). (2) Physical active boys have higher values of BMC (58.04 ± 16.52 vs. 46.92 ± 15.80 , $p<0.001$) and BMD (1.02 ± 0.18 vs. 0.84 ± 0.16 , $p<0.001$) than their non-active peers. (3) There are no differences in BA between physical active boys and their non-active peers (55.71 ± 8.80 vs. 54.15 ± 8.82 , $p=0.237$). (4) Age, maturity status and PA are important variables in the explanation of BMC and BMD. Together, these variables explain 63% and 65% of the variation of BMC and BMD, respectively. Only the age and maturity status have positive effects on the BA, explaining together 50% of the variation of BA.

Conclusions: Base up on de results we can say that age, maturation and physical activity appears to influence both BMC and BMD. BA appear to be only under the influence of age and maturation.

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Dynamometric evaluation of takeoff in High Jump

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The takeoff plays a fundamental role on the result of the high jump, since it is there where the pattern of centre of mass is defined in order to achieve the maximum height possible to clear the bar. In the literature there are several studies concerned the kinematics of high jump but very few in the kinetics.

The aim of this research is to obtain technical information on the takeoff from dynamometer data.

Ground reaction forces data of nine skilled high jumpers were collected through a standard strain gauge Bertec (406080) force plate sampling at 1000Hz in three different sessions. Basic data processing (scaling, smoothing, cubic spline interpolation) was performed with some custom made Octave/Matlab scripts. The time series of vectorial ground reaction forces and impulses were studied for intra and inter subject reproducibility using basic descriptive statistics methods. An additional processing step was the coordinate system rotation, from the force plate to the anatomical planes. This was done considering the centre of pressure trajectory of the take-off foot for each trial.

Our results show that some feature resulting from the approach run can be observed in the take-off. When the athletes performed a correct curve run-up the forces in the anteroposterior component were always negative which means that he will not generate additional force to go upward. Motions from the lead leg and arms were evaluated in the medial lateral component. Differences in the vertical as well medio-lateral component were due actions of the uprightness of the trunk, leg and arms action. It was observed lower reproducibility in the medial lateral component of ground reaction forces (Fig.1). In addition, we found that it is during the

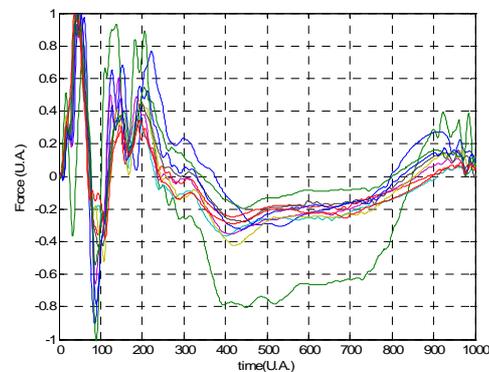


Fig. 1 – Reproducibility of medial-lateral component of ground reaction force. Each colour represent one attempt.

period in which the entire foot is in contact with ground that the instability increases for all the components.

The main conclusions of this work are: (i) Ground reaction forces can be used to perform technical evaluation. (ii) each jumper has specific takeoff characteristics resulting from the technical condition (iii) the ground reaction forces present high reproducibility in the early and final stages of the takeoff.

Behavioural Plasticity in Goalball athletes: Research on Portugal teams

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Since around 1930 the word plasticity had been employed and can be defined as the body's ability to adjust itself to internal and external environmental changes due to synergetic action of the different organs which are coordinated by Central Nervous System. Yet, different levels of behavioural analysis have been found in research where plasticity and behaviour are being connected, since the analysis of specific answers which are learned and known by heart till the assessment of more complex behavioural patterns involved in recovery of function. In Goalball, the sport played most by visually handicapped persons, the players' behaviour plays an important role directly or indirectly on the final result. This sport features demand from the players the need to choose the appropriate answers to each situation, once the game actions are presented in various ways, and thus, the players' behavioural attitude is very important during the game. Goalball meets many situations during the game which show clearly the need and the importance of watching the players' behaviour not only while playing formal but also when practicing, in order to place the player in a position of success during his performance while acting defensively or attacking.

The goal of our study was to verify the behavioural plasticity of Goalball blind athletes while playing formal.

Our sample comprised the 5 teams of the Portugal National Championships of 2007/2008. A questionnaire and a system of observational analysis were employed as instruments. The instrument has fulfilled the validation requirements. A SPSS Program version 17.0 was employed to data treatment, and descriptive statistics was adapted with frequencies and percentages.

The Main Outcomes were: Concerning attacking actions: i) Start: the players of all teams often employed the right hand when throwing ; ii)Attacking Position: the throwing was performed in a standing position: iii) Attacking Zone :the right and the left zones were the most employed while performing the throw; iv) Throw Type: the "referee throws" and shootings were the most employed; v) Trajectory: The straight line, the crossed and the diagonal trajectories were often employed while throwing. Defensive Actions: i) Defensive position: the base position was the most adopted during the attacking actions; ii) Defensive Zone: The central and left zones were the most adopted; iii) Defence Type: teams often adopted the defensive strategy followed by a shooting to the opponent team as well as the defence followed by a hand over- placement to a team mate.

Drawing Results: This study enables us to conclude that all the teams had similar results concerning athletes' behaviour while taking attacking and defensive actions.

Familial aggregation on trunkal fat of Portuguese nuclear families. A quantitative genetic study.

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An android fat pattern induces significant risks in the manifestation of cardiovascular disease (CVD) and metabolic disorders [1-3]. There is evidence that some individuals are more susceptible to changes in trunkal fat (TF), suggesting that genetic factors play important roles in the etiology of this multifactorial and polygenic phenotype [3-4]. There is a lack of studies in Genetic Epidemiology in Portugal aiming at verifying familiar aggregation (FA) and predicting the influence of the genetic factors in TF.

The aims of this study were to (1) identify the presence of indirect transmission of genetic factors between parents and children in two phenotypes of TF, and (2) to estimate the contribution of genetic and environmental factors responsible for phenotypic variation on relative trunkal fat (TF_{rel}) and absolute trunkal fat (TF_{abs}).

The sample consisted of 422 individuals from 107 Portuguese nuclear families. TF_{rel} and TF_{abs} were measured with a bioelectric impedance device, Tanita ® model BC-418MA. Family structure and quantitative genetic analysis of the two phenotypes between different family members were verified in PEDSTATS. Familiar correlations were computed in the FCOR module of SAGE 5.3. Heritability estimates (h^2) estimated using a maximum likelihood method implemented in SOLAR 4.0.

Correlation coefficients (intraclass between same-sex members and interclass between opposite-sex pairs) were low-to-moderate: TF_{rel} ($0.205 < r < 0.738$) and TF_{abs} ($0.199 < r < 0.782$). Genetic factors explained 50 and 47% of the variation in phenotypes of TF_{rel} and TF_{abs} , respectively.

These results (1) showed a strong familial aggregation on trunkal fat of Portuguese nuclear families; (2) a moderate-to-high genetic influence in their distribution at the population level; (3) contribute to promote the need for further studies in Genetic Epidemiology (4) and suggest the need for physical activity and nutritional interventions directed to all family members to reduce this risk factor – high levels of trunkal fat.

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The contribute of walking to preserve the functional capacity in older people

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Concerning with the increase in the elderly population, it is important to understand how physical activity, specially walking, can assist elderly individuals in the maintenance of functional autonomy and therefore on their quality of life.

The aim of this study was to understand and evaluate how walking can contribute to maintain functional capacity and quality of life of elderly individuals. Fifty elderly individuals (73.28 ± 6.94 years) of both genders (25 walkers and 25 non-walkers) were studied. Physical fitness (Senior Fitness Test), Physical activity (IPAQ questionnaire), perceived health (MOS SF-36), anthropometric variables (BMI and waist circumference) and a socio-economic questionnaire were assessed.

The main results of this study show that the walkers have better physical fitness level, superior subjective perception of health and higher levels of physical activity (W=386,8 ±48,93min vs NW=74,2±30,77min , p<0.001) In opposition, the non-walkers individuals presented higher values of BMI (Male W=25,35±1,41kg/m² vs Male NW=27,37±3,34Kg/m²), (Female W=24,72±3,37kg/m² vs Female NW=28,05±3,71 Kg/m²) and waist circumference then walkers (Male W=86,33±5,72cm vs Male NW=99,63±7,29cm), (Female W=84,13±7,17cm vs Female NW=99,18±13,20cm). These findings suggest that walking can be able to improve elderly's physical function, health and quality of life.

Development of a titration simulation software and its validation and application in real conditions

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Titration is an integral component of chemistry laboratory, and is frequently criticized as tedious and laborious [1–2]. A variety of approaches have been taken toward automating titrators for the undergraduate laboratory [3–5]. Moreover titrations continue to be an important technique in analytical chemistry, and are often introduced as several types including acid–base, redox, and complexation.

A common titration experiment performed in quantitative analysis lab involves a titrant with a certain concentration and known volumes of titrant and titrand. The end-point of the titration, estimated using indicators, reading of the titration curve, using first and second derivative, or through a Gran transformed function, being the concentration of the titrand determined.

Titration simulation is not new but has been usually used for teaching purposes [6]. In this work we pretended to develop a software for titration simulation and use the obtained models in the time reduction of titration process. For these purposes a titration simulator and an automatic titrator were developed. The titration model was applied in the estimation of titration curve based on experimental points. This strategy allowed a reduction of the number of additions needed to perform the titration process and consequently a reduction in time spent to perform the titration. Once the titration curve is estimated, the experimental curve is obtained using the model obtained in the simulation and the end-point calculated using first and second derivative method.

All the software and titration set-up were validated using different kinds of titrations namely acid-base, redox, precipitation and complexation. With the obtained results it was possible to conclude the advantages of the proposed process.

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Anodic stripping voltammetric analysis of trace heavy metals using extreme cathodic accumulation potentials

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In recent years, due to the development of electronics and informatics, the interest in the electrochemical methods to determine trace heavy metals arose after having been thrown to a secondary place by the spectroscopic methods.

Anodic stripping voltammetry (ASV) is a well established electroanalytical technique for the determination of heavy metals cations with high sensitivity, using the hanging mercury drop electrode (HMDE) or thin mercury film electrodes. An accumulation step is done by reducing the metallic cations to the metal forms, which are amalgamated with the mercury of the electrode. The cathodic potential applied for the accumulation step (E_{ac}) is selected in order to only reduce the metallic cations.

In this work a systematic study of the effect of very cathodic accumulation potentials, during which the metallic cations and the solvent are reduced, was performed, using the HMDE. With such very cathodic potentials, an average increase of about ten times on the voltammetric signals was found for the cations zinc(II), cadmium(II), lead(II) and copper(II) (Fig. 1), when compared to the classical methodology. Also, we found lower limits of detection ($< 1 \mu\text{g/L}$) for accumulation times lower than 5 seconds. Besides, with this procedure it was not necessary to stir the solution during the accumulation step. The fundamentals of such effect are discussed.

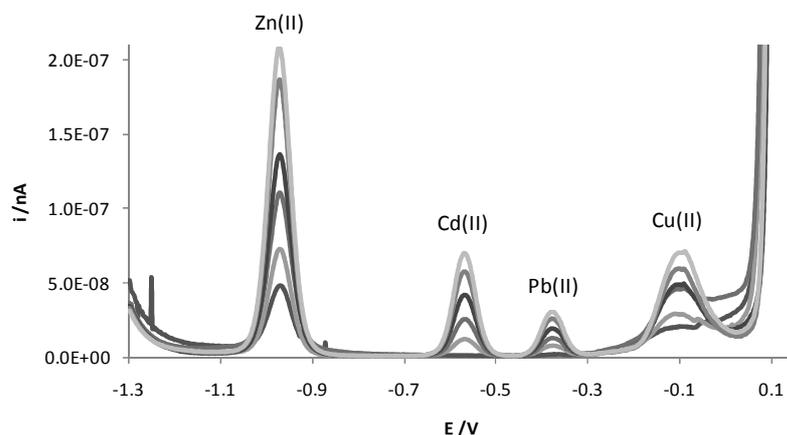


Fig. 1 – ASV voltammograms of standard solutions of zinc(II), cadmium(II), lead(II) and copper(II); concentrations range: 0-10 ppb; $E_{ac} = 2 \text{ V}$; $t_{ac} = 10 \text{ s}$.

Optimization of a capillary electrophoresis method for the determination of the amino acid β -N-methylamino-L-alanine

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Nonproteinogenic amino acids are naturally occurring ones which are not genetically encoded [1]. Amongst these, the amino acid β -N-methylamino-L-alanine (BMAA) is currently believed to be produced by diverse species of cyanobacteria [2]. Because of a possible role of BMAA as a neurotoxin, several analytical techniques have been reported for the determination of this amino acid [3]. Some of these works reported a previous sample derivatization step [2]. However, these results have been challenged by more recent works without the derivatization step [3].

In this work the optimization of a capillary electrophoresis (CE) method for BMAA determination is described. This was achieved by assessing the limit of detection (LOD), linear range, and applicability of the method for measuring BMAA in different cyanobacteria culture media (f2, Z8, Z8¹⁰, MN) with different salinities. BMAA was determined using a fused-silica capillary column (50 cm x 75 μ m I.D.), with 5 mM sodium tetraborate solution, under the applied voltage of 25 kV, at 25 °C, with no sample processing or concentration.

One of the resulting peaks can be seen in 1. Results indicate that CE appears to be highly adequate technique to measure BMAA, given its specificity for amino and the cheapness and readiness of the analysis. The utility of the method can be extended further to analysis coupled with sample pre-extraction procedures.

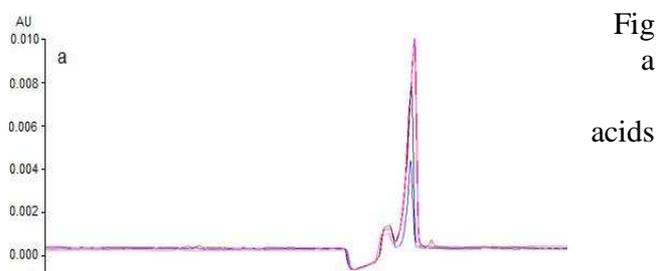


Fig.1: Electrophoregram obtained in a f2 culture media.

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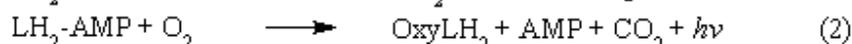
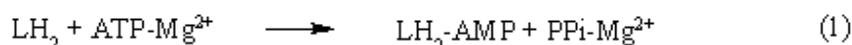
Acknowledgements: This work was partially funded by Fundação para a Ciência e a Tecnologia, Portugal, (fellowship awarded to M. Baptista (SFRH/BD/44373/2008) and the CONC-REEQ/304/2001 re-equipment project) and U.Porto/Santander Totta, Portugal, through the "Investigação Jovem na U. Porto" program.

Synthesis and enzymatic characterization of oxyluciferin

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Firefly luciferase (EC 1.13.12.7) is an enzyme that catalyzes the oxidation of firefly luciferin (LH₂), giving rise to light. This enzymatic reaction involves the formation of an adenylyl intermediate (LH₂-AMP, Eq.1) and its subsequent oxidation with the release of oxyluciferin (OxyLH₂, Eq.2) [1].



OxyLH₂ (Fig.1) was chemically synthesized by Suzuki *et al* [2] and was proposed to be the real light-emitting molecule, besides being one of the known inhibitors of luciferase in the bioluminescent reaction [3].

In this work the chemical synthesis of OxyLH₂ is described. This synthesis is based on the condensation reaction of 2-cyano-6-hydroxybenzothiazole with ethyl thioglycolate, as described by Suzuki *et al* [2]. The characterization of the obtained OxyLH₂ will be made by techniques as RP-HPLC and NMR spectroscopy [1].

With this approach we pretend to demonstrate, starting from previous results [1], that is possible obtain OxyLH₂ with a very high degree of purity. resulting OxyLH₂ can then be used in enzymatic studies, like luciferase response to the synthesized OxyLH₂, as well as novel investigation lines about biochemical properties.

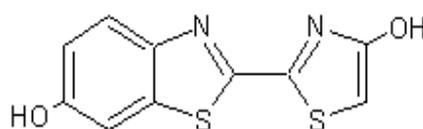


Fig. 1: Oxyluciferin

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Acknowledgements: Financial support from Fundação para a Ciência e a Tecnologia (FCT, Lisbon) (FSE-FEDER) (Project PTDC/QUI/71366/2006) is acknowledged.

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Synthesis and Biological Evaluation of Novel rasagiline analogues as potential neuroprotective agents

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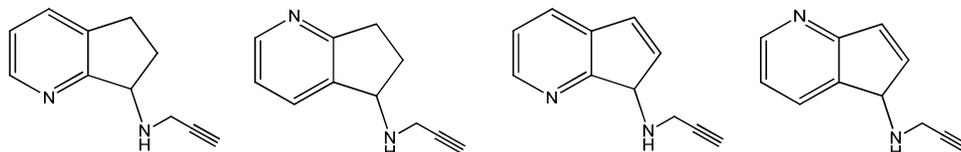
Neurodegenerative diseases are one of the major causes of death in aged population all over the world. The Alzheimer's disease (AD) is the most common amongst these, followed by the Parkinson's disease (PD). The existing therapies against AD and PD are still very far from doctor and patient's expectations. In this way, the drawing of new therapeutical neuroprotective agents is a great challenge, in order to improve the effectiveness of the existing drugs, or to introduce new alternative therapies.

Neuroprotection has two protagonists, **selegiline** and **rasagiline**, propargylaminic drugs usually used in PD treatment as monoamine oxidase-B (MAO-B) inhibitors. Rasagiline has been mentioned in diverse studies as being therapeutically superior in comparison with selegiline, this fact motivated a more detailed study of its action mechanisms and attainment of synthetic derivatives aiming to increase its neuroprotective effects.



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In this work, we propose the synthesis of new rasagiline derivatives, which replaces the rasagiline's benzenic ring by a pyridinic ring, and the evaluation of the neuroprotective activity, which will allow us to establish potential activity against AD and PD.



The chemical synthesis will be done in due to provide a enough number of new compounds endowed with molecular diversity in the pentacyclic ring from 6,7-dihydro-5H-cyclopenta[b]pyridine, commercially available. Classic synthetic methodologies will be used, in order to prepare different chemical precursors which will enhance the chemical diversity. In a first step, racemic mixtures will be obtained and, later, the enantiomeric pure compounds will be achieved through chemical or enzymatic resolution of the racemates or through enantioselective synthetic processes.

The biological evaluation will be carried out by *MAO*, *AchE* and *BchE* inhibitory activity measure, using selegiline and rasagiline as standards.

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Utilization of a chromogenic substrate for the evaluation of trypsin activity in ionic liquids

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In the last years, the utilization of ionic liquids in enzymatic methodologies, as an alternative to volatile organic solvents, has showed to be an advantageous approach that results in green methodologies with high sensitivity [1]. To further increase the potential of biocatalysis in ionic liquids it is important to study and understand the behavior of enzymes in this kind of solvents being then mandatory to develop simple and fast monitoring methods. Spectrophotometry seems to be quite adequate for this kind of study since they allow the continuous monitoring of products and substrates in real time by means of simple instruments and methodologies [2].

In this work the evaluation of trypsin activity was based on the hydrolysis of N α -benzoyl-DL-arginine-4-nitroanilide (BAPNA) resulting in the release of 4-nitroaniline whose absorbance was monitored at 405 nm. This kind of substrate has been used in enzyme activity assays resulting in simple and effective methodologies [3].

The studies were planned with aim of compare the enzyme activity in both water and biphasic media containing ionic liquids. In the assays in biphasic media BAPNA was prepared in solutions with increasing concentrations of bmim [BF₄] (1-butyl-3-methyl-imidazolium tetrafluoroborate), emim [BF₄] (1-ethyl-3-methylimidazolium tetrafluoro-borate and emim [Tf₂] (1-ethyl-3-methylimidazolium trifluoromethanesulfonate) in order to investigate the effect of these ionic liquids on trypsin activity.

In each assay 500 μ L of water or water/ionic liquid, 350 μ L of BAPNA and 150 μ L of trypsin (0.64 mg L⁻¹ in Tris HCl/CaCl₂ buffer, pH 8) were mixed in a cuvette and the absorbance of the mixture was monitored during 240 s. The assays were repeated for BAPNA concentrations in the range of 0.1 to 0.9 mmol L⁻¹ and for ionic liquid concentrations up to 15%. It was observed that even though the enzyme kept its activity in all the studied ionic liquids a reduction of about 90% was observed in the presence of emim [Tf₂]. From the studied compounds, bmim [BF₄] showed to affect less trypsin activity so that this ionic liquid can be a good option when a strictly aqueous environment is not adequate.

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Selection of solvent for polycyclic aromatic hydrocarbons microwave-assisted extraction from fish

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In contrast to the potential health benefits of dietary fish intake, an issue of concern related with frequent fish consumption is the risk derived from exposure to chemical pollutants. Polycyclic aromatic hydrocarbons (PAHs) are a large group of organic compounds with two or more fused aromatic rings. According to different health and environmental protection organizations, such as the International Agency for Research on Cancer (IARC) and the United States Environmental Protection Agency (USEPA), several PAHs have mutagenic, carcinogenic and endocrine disrupting properties [1]. In particular, benzo[a]pyrene has been identified as being highly carcinogenic. The USEPA has promulgated 16 unsubstituted PAHs as priority pollutants which are commonly quantified for purposes of evaluating potential health effects in humans.

In this study, preliminary tests were made to choose the solvent for microwave-assisted extraction of 18 PAHs (the 16 regarded as priority pollutants by the U.S. Environmental Protection Agency, benzo[j]fluoranthene and dibenzo(a,l)pyrene) from fish samples. From the principles of microwave heating, it is understood that the choice of the microwave extraction solvent, is a very important parameter, and depends upon its ability to absorb microwaves as defined by its dielectric constant. Non-polar solvents cannot absorb microwave energy and despite the fact that they are known to be good extraction solvents for aromatic compounds they cannot be used alone. Acetonitrile and hexane-acetone (1:1, v/v) were tested. Studies were performed at five extraction temperatures (90, 100, 110, 120 and 130 °C), with the following extraction conditions: 0,5 g of fish sample, 20 mL of solvent, 20 minutes of extraction time, 100 psi, 100% of power and medium stirring. For both solvents, the best results were obtained at 110 °C and 120 °C. For acetonitrile, the overall average recoveries for the 18 PAHs were 76.9±17.9% and 74.9±17.4% at 110 °C and 120 °C, respectively. For hexane-acetone (1:1, v/v), mean recoveries values ranged between 66.2±18.2% (at 110 °C) and 67.5±19.8% (at 120 °C). Acetonitrile at 110 °C was selected as the optimum.

Acknowledgments:

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Scavenging activities of sulfasalazine and its metabolites, sulfapyridine and 5-aminosalicylic acid, against reactive oxygen species

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Sulfasalazine is a prodrug consisting on a molecule of 5-aminosalicylic acid (5-ASA) and sulfapyridine (SP), linked by an azo bond, which has been shown to be useful in the therapy of ulcerative colitis, as well as rheumatic diseases, such as rheumatoid arthritis and ankylosing spondylitis. Nearly all the prodrug taken orally reaches the colon intact, where it is converted in its two metabolites by colonic bacterial enzymes. SP is an antibacterial agent and acts as a carrier to deliver 5-ASA to the colon. 5-ASA is the main active component of sulfasalazine and acts as an anti-inflammatory agent. The mechanism of action of sulfasalazine is not yet clearly understood, although the scavenging of pro-oxidant reactive species may have an important role by preventing the oxidative stress status characteristic of inflammatory processes. Thus, the present study was undertaken to evaluate the scavenging activity for reactive oxygen species (ROS), namely superoxide radical ($O_2^{\bullet-}$), hydrogen peroxide (H_2O_2), singlet oxygen (1O_2), hypochlorous acid (HOCl), and peroxy radical (ROO^{\bullet}) by sulfasalazine and its metabolites. To accomplish this aim, several *in vitro* microanalysis methodologies with fluorimetric, luminometric, or UV-Vis detection were used.

The results showed that both 5-ASA and sulfasalazine were able to scavenge all the tested ROS while SP was practically ineffective in all the assays. For HOCl, 1O_2 , and ROO^{\bullet} , 5-ASA showed the best scavenging effects with IC_{50s} of $1.85 \pm 0.26 \mu M$ and $29.5 \pm 5.7 \mu M$, and an ORAC of 2.77 ± 0.35 , respectively. In what concerns to $O_2^{\bullet-}$ and H_2O_2 , sulfasalazine showed superior activity achieving an IC_{40} of 137 ± 17 and an IC_{50} of 457 ± 50 , respectively.

In conclusion, this study showed that the anti-inflammatory therapeutic effects of sulfasalazine may result, in part, from the antioxidant properties of this prodrug and its metabolite 5-ASA.

Acknowledgements:

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Ana Gomes acknowledges FCT and FSE her post-doctoral grant (SFRH/BPD/63179/2009).

Fatty acid profile of horse mackerel (*Trachurus trachurus*) from the Atlantic north-eastern coast

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Consumers are increasingly aware of the importance of healthy diets and recognize the necessity of balanced regimes. Fish and fisheries products are among the essential options due to their high protein content and polyunsaturated lipids, particularly those of the omega-3 ($\omega 3$) family, of utmost importance in terms of nutrition physiology [1]. The omega-3 fatty acids play vital roles in human nutrition, disease prevention and health promotion. Moreover, a balanced $\omega 3/\omega 6$ ratio is essential for normal growth and development and for the correct performance of several systems, including the cardiovascular, immune and neurological ones [2].

The aim of this work is to provide information on the lipid profile of horse mackerel (*Trachurus trachurus*) of the Atlantic north-eastern coast and to study the influence of gender, fish moisture content and season of capture in the fatty acid composition of this highly consumed fish species.

The moisture content for the different samples ranged from $75.4 \pm 0.5\%$ (for male) to $77.3 \pm 0.4\%$ (for female).

The fatty acid composition of fish samples (meat only), purchased from different local markets in Oporto region (NW Portugal) within a six months period, was quantified by gas-chromatography, after extraction by a modified Folch procedure using a mixture of dichloromethane-methanol (2:1, v/v), and derivatization to their methyl esters. Seventeen fatty acids were determined and the more abundant were docosahexaenoic acid (DHA; 22:6 $\omega 3$), palmitic acid (16:0), stearic acid (18:0), oleic acid (18:1 $\omega 9$) and eicosapentanoic acid (EPA, 20:5 $\omega 3$). The total PUFA ($\omega 6 + \omega 3$) varied from 34.9 to 36.0% and the $\omega 3/\omega 6$ ratio from 5.6 to 5.9. The monounsaturated fatty acids varied from 33.0 to 34.5% and the saturated ones from 29.3 to 29.7%.

The results indicate that horse mackerel is a good and healthy source of lipids.

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Automatic flow methodology for quinine determination in biological samples

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Quinine is a natural occurring cinchona alkaloid that has been used in medicine for ages as anti-malaria agent. However, quinine is also a potentially toxic drug and its overuse has been determined to cause and complicate other health conditions. The typical syndrome of quinine side effects is called cinchonism and it can be mild in usual therapeutic dosage or severe in larger doses. The toxic effects of quinine appear to be related to plasma concentrations.

In this sense the determination of quinine in human biological fluids is of utmost importance in the clinical chemistry field. For this purpose, several methods have been reported based on HPLC procedures. However, they are time consuming and have a low sampling throughput, requiring sample pre-treatment (including extraction with organic solvents).

Therefore the present work is aimed to develop an automatic analytical flow methodology for the automatic, direct, rapid and reliable determination of quinine in urine and serum samples. The designed multimpumping flow analysis system (MPFS) [1] comprises an in-line extraction column (filled with Amberlite XAD-4 resin), where the quinine was retained using basic conditions and then eluted with H_2SO_4 , being finally propelled towards the fluorometric detector. The influence of parameters such as eluent concentration, elution flow rate and volume, flow rate and volume of the regeneration and cleanup steps as well as sample volume, etc., on the sensitivity and performance of the MPFS system were studied and the optimum reaction conditions subsequently selected.

The proposed automatic method is being applied to the urine and serum samples and high relative extraction recoveries from these biological matrices were attained.

Acknowledgements: André R.T.S. Araujo thanks FCT and FSE (III Quadro Comunitário de Apoio) for the Ph.D. grant SFRH/BD/23029/2005.

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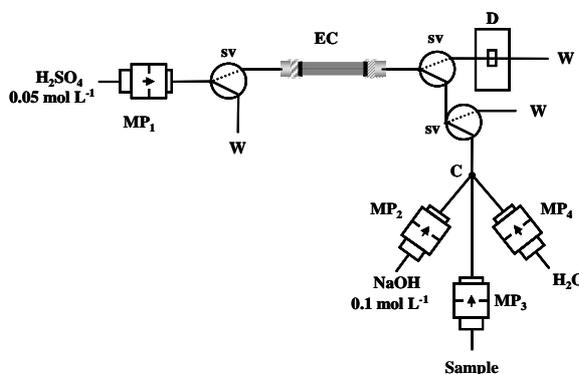


Fig. 1 Flow manifold for quinine determination in biological samples: MP -10 μ L solenoid micropumps; C - confluence point; D - Fluorimetric detector ($\lambda_{excitation}=250$ nm; $\lambda_{emission}=450$ nm); sv - solenoid commutation valves; EC - extraction column; W - waste.

Automated evaluation of the effect of ionic liquids on immobilized trypsin

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The increasing use of ionic liquids in biocatalytic procedures with interesting results in terms of sensitivity and selectivity demands specific studies of enzyme activity to evaluate the effect of these solvents on enzyme behavior [1]. Usually, this kind of studies is performed on enzymes in solution but the utilization of immobilized biocatalysts seems to be a good option for routine implementation since it guarantees good catalytic activity and enzyme reutilization, leading to a significant reduction of analysis cost [2]. In this work the enzyme trypsin was immobilized in alkyl amine glass beads using glutaraldehyde as cross-linking reagent. The immobilized enzyme was introduced in a perspex column (i.d.: 4 mm; 3 cm) and the reactor was incorporated in a sequential injection analysis (SIA) system enabling the easy automation of the procedure for enzyme activity evaluation.

The methodology was based on the hydrolysis of N α -benzoyl-DL-arginine-4-nitroanilide (BAPNA) resulting in the release of 4-nitroaniline whose absorbance was monitored at 405 nm. This kind of substrate has been used in enzyme activity assays resulting in simple and effective methodologies [3].

In each cycle 50 μ L of BAPNA were aspirated to the holding coil at a flow rate of 3 mL min⁻¹ and sent, by flow reversal, to the enzyme reactor. Then, a stop period of 90 s was implemented and after that the reaction product was sent to the detector at a flow rate of 1.5 mL min⁻¹. A signal proportional to the enzyme activity was registered.

In the assays in ionic liquids, BAPNA was prepared in solutions of bmim [BF₄] (1-butyl-3-methyl-imidazolium tetrafluoroborate), emim [BF₄] (1-ethyl-3-methylimidazolium tetrafluoroborate and emim [Tf₂] (1-ethyl-3-methylimidazolium trifluoromethane-sulfonate) up to 50% in order to investigate the effect of these ionic liquids on immobilized trypsin activity.

Acknowledgments: Susana Costa thanks for a grant in the scope of the project BII/REQUIMTE/GABAI-6/2009

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Chiral Xanthenes with Potencial Antioxidant and Anti-inflammatory Activities: Synthesis and Structure Elucidation

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Chiral compounds represent almost one-third of all drug sales worldwide and are of great importance in Medicinal Chemistry [1]. Some chiral xanthone derivatives (CXD) have revealed important biological activities with high enantioselectivity [2,3]. There are described several polyphenolic xanthenes with antioxidant and anti-inflammatory effects [4], but no examples relating CXD with these biological activities.

Considering all these features six new CXD in enantiomerically pure form were synthesized (**Fig. 1**) and their structures elucidated by spectroscopic methods (¹H NMR, ¹³C NMR and IV).

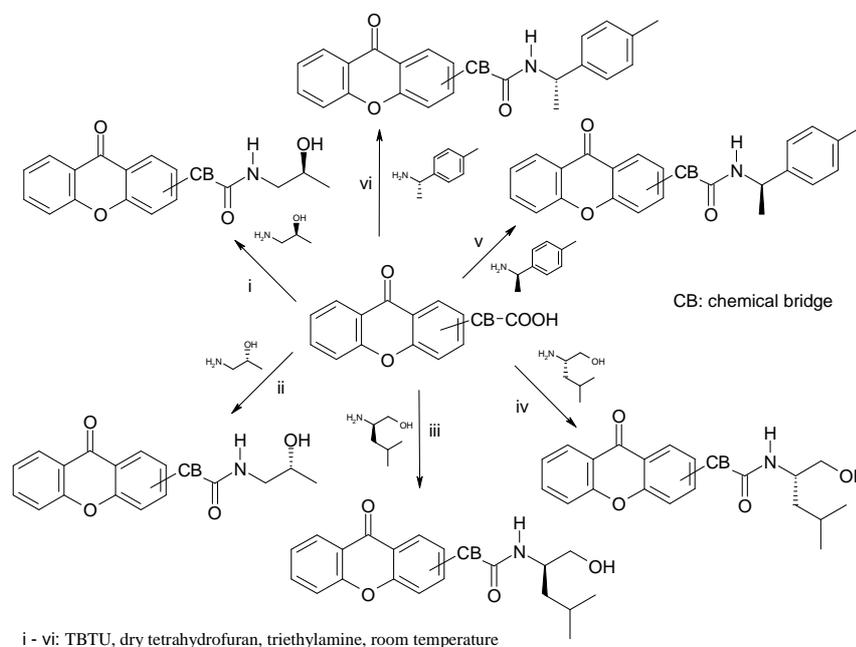


Fig. 1. Schematic representation of the synthesis of the CXD.

These coupling reactions showed very good yields and short reaction times. All CXD will be evaluated for their antioxidant and anti-inflammatory activities.

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HPLC Enantioseparation of Chiral Xanthone Derivatives on Polysaccharide-based Stationary Phases

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Over the last two decades Chiral High-Performance Liquid Chromatography (HPLC) has become a powerful and essential analytical tool for the resolution of racemates, evaluation of the enantiomeric purity, control of asymmetric reactions and pharmacokinetic studies [1]. In our group analytical HPLC methods using carbamate chiral stationary phases (CSP) of polysaccharide derivatives were already used for resolution of racemic xanthonolignoids [2,3]. Chiral xanthone derivatives (CXD) are of great interest since can be associated with important pharmacological activities such as anticonvulsant, antidepressant and antitumor [4], with mechanisms of action many times associated with enantioselectivity [4].

This work describes the resolution of a small library of CXD (**Fig. 1**) on two polysaccharide-based columns, under multimodal elution.

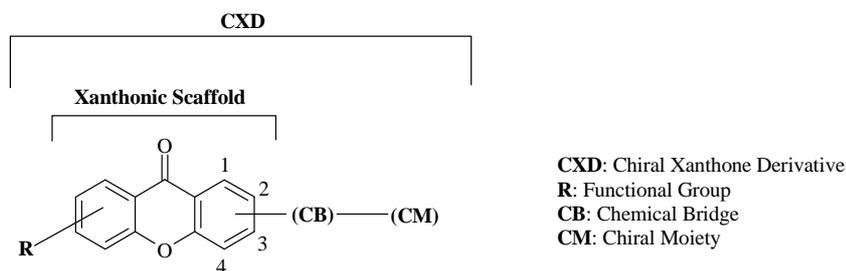


Fig. 1 Schematic representation of a CXD.

The CSP consisted of cellulose *tris*-3,5-dimethylphenyl carbamate (CSP-1) and amylose *tris*-3,5-dimethylphenyl carbamate (CSP-2) coated onto APS-Nucleosil and have proved to be successful to separate this class of compounds.

The best performance was achieved on CSP-2 showing excellent enantioselectivity and resolution under normal, reversed-phase, and polar organic conditions, for all the CXD.

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CdS Quantum Dots encapsulated in zeolites

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Quantum dots are semiconductor nanocrystals composed of elements of periodic groups II-VI, III-V, or IV-VI. Their features offer the promise of a color-tunable, flexible, all-purpose chromophore system, in which strong quantum confinement of the carriers leads to unique size-dependent linear and nonlinear optical properties, with various prospective applications in optoelectronic devices, nonlinear optical devices and biological labels[1]. However, their aggregation adversely affects their light emission, undermining their incorporation in solid matrices which are used to create nanostructural materials with unique physical and chemical properties. This problem can be minimized by quantum dots encapsulation in chemically inert matrices, like zeolites, with an accurately control dispersion of the nanoparticles. It has been shown that zeolite-encapsulated QDs have high third order nonlinear optical properties and the potential to be developed into high-efficiency photocatalysts for water splitting [2].

In this work, after matrices purification process, the CdS quantum dots were encapsulated in zeolites structures by a green chemistry approach *i.e.* low energy consumption and low toxic chemicals, using 3-mercaptopropionic acid as capping agent. The choice of these quantum dots was based in their peculiar properties, allowing their application in optoelectronic, photocatalytic, solar conversion systems and fluorescent markers in molecular recognition [3].

For zeolites encapsulated CdS quantum dots, we have observed a relationship between their structures and fluorescent properties, which result in changes of the fluorescence intensity and maximum wavelength emission (Fig.1). This can be explained by a different distribution of Cd²⁺ within host material, promoting different ways of Cd atoms coordination with framework oxygen atoms and so affecting CdS quantum dots stability.

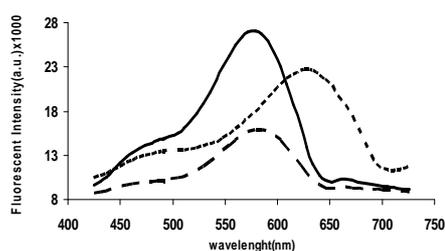


Fig. 1- Emission spectra of the CdS encapsulated zeolites: (—) ZSM-5-CdS ODs: (···) Mordenite-CdS ODs: (- - -)

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Scavenging activities of sulfasalazine and its metabolites, sulfapyridine and 5-aminosalicylic acid, against reactive nitrogen species

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Sulfasalazine is a prodrug consisting on a molecule of 5-aminosalicylic acid (5-ASA) and sulfapyridine (SP), linked by an azo bond, which has been shown to be useful in the therapy of ulcerative colitis, as well as rheumatic diseases, such as rheumatoid arthritis and ankylosing spondylitis. Nearly all the prodrug taken orally reaches the colon intact, where it is converted in its two metabolites by colonic bacterial enzymes. SP is an antibacterial agent and acts as a carrier to deliver 5-ASA to the colon. 5-ASA is the main active component of sulfasalazine and acts as an anti-inflammatory agent. The mechanism of action of sulfasalazine is not yet clearly understood, although the scavenging of pro-oxidant reactive species may have an important role by preventing the oxidative stress status characteristic of inflammatory processes. Thus, the present study was undertaken to evaluate the scavenging activity for reactive nitrogen species (RNS), namely nitric oxide ($\bullet\text{NO}$) and peroxynitrite (ONOO^-) by sulfasalazine and its metabolites. The ONOO^- scavenging activity was measured by monitoring the effect of the tested compounds on ONOO^- -induced oxidation of non-fluorescent dihydrorhodamine 123 (DHR) to fluorescent rhodamine 123. In a parallel set of experiments, the assays were performed in the presence of 25 mM NaHCO_3 in order to simulate the physiological CO_2 concentrations. The $\bullet\text{NO}$ scavenging activity was measured by monitoring the effect of the tested compounds on $\bullet\text{NO}$ -induced oxidation of non-fluorescent 4,5-diaminofluorescein (DAF-2) to fluorescent triazolofluorescein (DAF-2T).

The results showed that 5-ASA is a strong scavenger of $\bullet\text{NO}$ and ONOO^- (with and without bicarbonate), having achieved $\text{IC}_{50\text{s}}$ in the low micromolar range (1.06 ± 0.21 , 2.88 ± 0.43 , and 0.68 ± 0.09 μM , respectively). Sulfasalazine was also able to scavenge these RNS, although with a much lower potency than 5-ASA ($\text{IC}_{50\text{s}}$ of 536 ± 89 , 148 ± 16 , and 90.6 ± 22.1 μM , respectively). Sulfapyridine was unable to scavenge $\bullet\text{NO}$ in the tested concentrations but was shown to scavenge ONOO^- , with a higher strength when the assay was performed in the presence of 25 mM of bicarbonate ($\text{IC}_{50\text{s}}$ of 257 ± 41 , with bicarbonate and 1676 ± 35 μM , without bicarbonate).

In conclusion, the RNS-scavenging effects of sulfasalazine and its metabolites shown in this study may contribute to the anti-inflammatory effects mediated by sulfasalazine through the prevention of the oxidative/nitrative/nitrosative damages caused by these species.

Acknowledgements:

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Interaction of resveratrol with model membranes

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Resveratrol is a compound, found in grapes among other fruits, with several pharmacological effects which include antioxidant, antibiotic and chemopreventive properties. Although the biological positive effects of resveratrol are largely admitted, little is known about the transport and distribution of this compound in the body. Generally the transport and distribution of drugs in the body are important to elucidate their biological effects or possible pharmacological properties. The primary mechanism of gastrointestinal absorption of the vast majority of drugs is believed to involve initial partitioning into cell membranes followed by passive transmembrane diffusion. After absorption and distribution, drugs keep interacting on the level of different biological membranes as well as inside the compartments that are limited by these membranes. For this reason, the lipophilicity of biologically active compounds is usually one of their most important pharmacological features, and interactions of drugs with membranes play an essential role in their biological activity. This is also the case of resveratrol, which presents poor water solubility, indicating a possible passive diffusion through the plasma membranes. Furthermore, alterations in membrane-lipid composition and structure appear to be related to the development of various cardiovascular pathologies, such as hypertension, atherosclerosis, coronary heart disease, sudden cardiac death, blood vessel integrity and thrombosis and thus compounds like resveratrol that present cardiovascular protective effects should be studied for their influence on lipid membranes. For all the pointed reasons, the study of the mechanism of action of resveratrol may fall in part in the domain of membranology, particularly in the investigation of the nature of the interaction between this drug and membrane phospholipids. Therefore, to understand the basic effects of resveratrol on membrane biophysical properties, *in vitro* models consisting of unilamellar liposomes were used. The chosen phospholipid was DPPC which is typical with regard to its role in determining the physical-chemical and biological properties of cellular membranes. Other physiological conditions were pursued, such as a buffered pH control with adjusted ionic strength similar to the blood plasma conditions (pH 7.4, $I=0.1$ M) and the use of the biologically active form of resveratrol (trans-resveratrol). Furthermore, some important techniques were used in this study to analyze and quantify the various aspects of resveratrol-membrane interactions. Such interactions not only alter the physicochemical properties of membranes which were studied by steady-state anisotropy measurements, but also influence and determine drug partition and location within the membrane which were evaluated by means of derivative spectrophotometry and fluorescence quenching studies. The information obtained can be valuable to better understand the type of interaction between resveratrol and the membranes in the living organisms. In addition, this is a study that gathers a range of techniques applied with the aim of systematically monitor the effects of resveratrol on the biophysical properties of biomembranes with the ultimate goal of relating these effects with some of the well documented pharmacological properties of this compound.

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Multi-pumping flow system for evaluation of scavenging capacity against on-line generated singlet oxygen

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In biological systems, reactive oxygen species (ROS) are considered to cause extensive oxidative damage to biological macromolecules, which is considered to be implicated in the pathology of various human diseases. Singlet oxygen ($^1\text{O}_2$) is an excited state of molecular oxygen and it is one of the most active intermediates involved in chemical and biochemical reactions [1]. Therefore, several analytical procedures have been developed for in vitro screening of the scavenging effects of endogenous compounds and potential therapeutic drugs against $^1\text{O}_2$ [2,3].

In this work an automated multi-pumping flow system was developed for the evaluation of scavenging capacity against $^1\text{O}_2$ with chemiluminometric detection. Multi-pumping flow systems (MPFS) employ, as exclusive active components, multiple solenoid-actuated micro-pumps, which acted simultaneously as solutions insertion, propelling and commuting units, assuring an easily controlled and compact analytical system [4]. Establishment of a pulsed flow is inherent to the micro-pumps actuation and leads to a fast and efficient mixture between the sample and reagents, enabling the immediate presentation of the reaction zone to the detector ensuring an adequate measurement of the light emitted from the short-lived excited state intermediates produced in the CL reaction. In the proposed procedure, $^1\text{O}_2$ was generated by catalytic decomposition of hydrogen peroxide by molybdate ions. The high versatility of the developed MPFS allowed the implementation of the on-line generation of $^1\text{O}_2$, its reaction with the scavenger molecule and the chemiluminometric detection of the remaining $^1\text{O}_2$ with luminol. The evaluation of the scavenging activity of the assayed compounds was accomplished in terms of the decrease of the monitored CL emission when compared to the blank signal, which corresponded to the maximum CL emission.

Acknowledgments: A.F.T. Silva thanks for a grant in the ambit of the project BII/REQUIMTE/GABAI-9/2008.

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***In vitro* assessment of meloxicam effects on biomembranes**

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Non-steroidal anti-inflammatory drugs (NSAIDs) have been used satisfactorily for decades in the treatment of inflammatory or rheumatic disorders and as common pain-killers. All the NSAIDs inhibit cyclooxygenase, reducing the endogenous production of mucosal prostaglandins that are inflammatory mediators. The inhibition of prostaglandin synthesis cannot explain all the aspects of NSAIDs toxicity. Unfortunately, gastrointestinal side-effects are associated continuously with NSAID therapy, especially with chronic use of these drugs. In addition, even the most recently developed formulations have failed to resolve this problem. NSAIDs result in gastric mucosal damage by affecting the gastric mucosal barrier due to altered production of inflammatory mediators. As weak organic acids, NSAIDs can also directly damage gastric mucosa with or without gastric acid. The gastric mucosal barrier against acid back-diffusion is a complex and dynamic defense system, consisting physically of mucus and bicarbonate. Considering this and knowing that the hydrophobicity of the gastric protective barrier is due to surface-active phospholipids, the experiments were performed with liposomes as membrane model systems made of DPPC which has been recognized as a highly surface-active phospholipid and a major component of such barrier. Furthermore, since the mucus layer exists between the highly acidic gastric lumen and the epithelial surface cells with pH close to neutrality, the pH of the lipid environment must play an important role in the chemical availability of the drugs and thus the experiments were performed at two pH values (5 and 7.4). Meloxicam which is a NSAID member appears to have low ulcerogenic potency and exhibits less gastric and local tissue irritation in comparison to other NSAIDs. Many authors have tried to establish what factors may account for the apparent low ulcerogenicity of meloxicam. However the topic effect of this drug in lipid bilayers has not yet been considered. According to this, modifications of membrane biophysical properties elicited by meloxicam were evaluated by fluorescence measurements of anisotropy. A fluorescent probe (TMA-DPH) with a well known membrane location was used to provide labelling the bilayer and, therefore, anisotropy studies constitutes a relatively easy means of reporting membrane fluidity and how is it changed by the presence of the drug, making also possible to determine the transition temperature of the lipids in different pH environments. The distribution of the drug between the aqueous and membrane media was quantified spectrophotometrically, while the location of drug within the lipid bilayers was studied by fluorescence quenching. Both techniques of drug location and partition within the membrane permitted to evaluate and compare the extent of penetration and/or interaction of the drug tested with membrane phospholipids.

As a conclusion, this work provided for a complete physical-chemical characterization of the interaction between the pharmaceutical drug meloxicam and membrane and will be of extreme importance for the interpretation of its pharmaceutical and toxic effects.

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Preparation and characterization of Pseudoazurin – Au and cytochrome c – Au nanoconjugates

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Bionanotechnology constitutes a new branch in nanotechnology, joining techniques and skills used broadly in the fields of chemistry, physics and biochemistry. The conjugation of biomolecules with nanoparticles hopes to create hybrid organic- inorganic systems with potential uses in the development of biosensors and with impact in future biotechnological applications [1].

The objective of this work is to prepare and characterize stable protein-nanoparticle conjugates using the proteins Pseudoazurin (PAz) from *Paracoccus pantotrophus* and Cytochrome *c* from horse heart (HCc) with gold nanoparticles (AuNPs).

P. pantotrophus pseudoazurin is a small type 1 copper protein (13.3 kDa) involved in electron transfer processes, mainly denitrification. The protein was heterologously expressed isolated and purified as previously described [2]. Cytochrome *c* is a low molecular mass protein (ca. 12 kDa) containing a heme group also involved in electron transfer processes. Gold nanoparticles were synthesized according to the method described by Turkevitch *et al.* [3] and used without further modification or functionalized with the peptide CALND.

The formation of PAZ-AuNP and HCc-NP bionanoconjugates was evaluated using different spectroscopic techniques, by ζ -potential determination at different protein-nanoparticle ratios, and by Atomic Force Microscopy. Langmuir isotherm fitting of ζ -potential data allowed the determination of protein molecules stoichiometry per AuNP in the bionanoconjugates.

The results obtained will be used to understand and optimize the interaction of protein with nanoparticles in order to obtain new hybrid systems with new physical/chemical properties and increased stability.

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Flow injection amperometric determination of ascorbic acid

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The association of flow-based techniques amperometric detectors offer noteworthy advantages in routine analysis, namely the reduction of the contact time between the sample and the working electrode together with the continuous flowing stream that passes through the detector (reaction products can be removed and the contamination of the electrode surface is minimized) shall be emphasized. This reduces the consumption of reagents and sample and increases the versatility concerning the adaptation of the manifold configuration to any specific determination.

In this work, a flow system developed for the amperometric determination of a great variety of pharmaceuticals that are known to lead the rapid poisoning of the working electrode surface is described.

This flow technique is based on the injection of an aliquot of sample into the carrier flow, not segmented, that carries the sample to the detector. Flow Injection Analysis (FIA) system allows the reproducibility of the sampling procedures and detection and control of sample dispersion.

This FIA manifold uses a Gilson Minipuls 3 peristaltic pump to propel the solutions, a valve to inject the solutions, an electrochemical system consisting of a VA 641 Metrohm detector, a 656 Metrohm electrochemical wall jet cell and the registration of the analytic signals was carried out on a Kipp & Zonen BD 112 recorder. The cell is composed by three electrodes, a glassy carbon working and auxiliary electrode and a Ag/AgCl (3M) reference electrode.

The flow of the different solutions was controlled through the inner diameter of the tubes and the rotation speed of the peristaltic pump. Both parameters were optimized so that the work was done with a flow rate of 1 mL / min with a solution of ascorbic acid 1×10^{-5} M. As carrier solution we used CH₃COONa/CH₃COOH (pH 5) buffer solution. Reagents of p.a. quality or similar were used without having been subjected to any additional purification. In the preparation of solutions, water purified by the Millipore Milli Q system (conductivity $< 0.1 \mu\text{S cm}^{-1}$) was used.

Then the difference in electrical potential was optimized using the following values (mV): 700, 750, 800, 850 and 900. The analytic signal with the greatest sensitivity and reproducibility was obtained with 850 mV.

We conclude that this FIA system enables a sampling rate of 72 samples h⁻¹ and is a good alternative and advantageous over the classic analytical methods.

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Phase Transition Thermodynamics of Perfluorocarbon alcohols by DSC

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Perfluorocarbon alcohols (PFAs) are a type of Perfluorinated Organic Compounds (PFCs) used in numerous commercial products like fire and textile protection agents, floor polishers, detergents, paints, paper treatment agents and electronic equipment.^[1] The energetic and structural study of these compounds with potential application as numerous commercial products is an important research target in our laboratory.^[2] In this work, a contribution to the phase transitions study of C7, C8, C9 and C10 perfluorocarbon alcohols will be presented. The structure of one of the compounds studied is presented in figure 1.

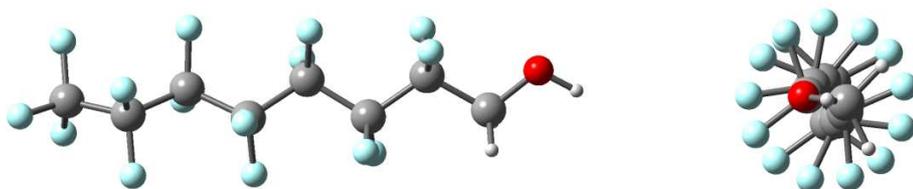


Figure 1 – Schematic representation of the 1H, 1H-Perfluorooctane-1-ol, $C_7F_{16}CH_2OH$

For each of these compounds, the temperature, molar enthalpies and entropies of fusion were measured in a power compensated differential scanning calorimetry (DSC) (SETARAM model 141). The thermodynamic results obtained in this work will be used to evaluate the solid-liquid equilibrium in terms of the contribution of the increasing perfluoralkyl chain length.

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Quantification of Chimassorb 944 in geotextiles samples

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Geotextiles are polymeric materials widely used in the construction of infrastructures, such as landfills, roads, railways, tunnels, dams and reservoirs. Geotextiles can have extended roles like separation, filtration, drainage, protection and reinforcement. An unlimited exposure of these materials to environmental conditions (like UV radiation, high temperatures and atmospheric oxygen) may affect their durability and compromise their long-term performance. The degradation suffered by these materials is often retarded and/or inhibited by the incorporation of chemical additives, such as UV stabilisers and antioxidants, in their composition. One of these additives, widely used, is Chimassorb 944 (C944) (Fig. 1), an antioxidant and light stabilizer. The determination of C944 during the degradation of the geotextiles can be an important way to evaluate the material durability [1].

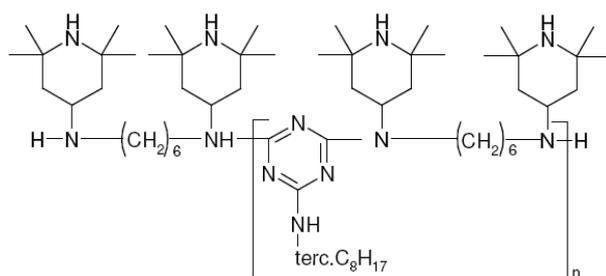


Fig. 1 – Chemical structure of Chimassorb 944

In this work, C944 was determined in geotextiles samples (intact or degraded) by liquid chromatography with ultraviolet detection. First the additive was extracted from the samples by ultrasonic extraction with dichloromethane. Then the extract was separated on a C18 column, being C944 eluted with dichloromethane and diethanolamine.

The results obtained showed that the level of C944 decreased as the degradation occurs.

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Development of a green method for the synthesis of metal nanoparticles

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Particular attention has been given to nanoparticles by the scientific community. Due to their unique properties, nanoparticles present a wide field of applications, particularly biological applications, such as biosensors, biological therapies for cancer, among others^[1]. Hence, the need for new, more efficient and green processes for the synthesis of nanoparticles^[2].

This work aims to synthesize, through a green method, nanospheres of gold, silver and mixed gold/silver. A photocatalytic process^[3], which uses a photocatalyst (tin (IV) porphyrin), triethanolamine (TEA) as a reducing agent, capping agents, and metallic precursor gold (HAuCl₄) and silver (AgNO₃) was employed. Various capping agents of natural origin were tested, such as arabic gum, starch, cellulose, and gliceropol. For further studies, the arabic gum was selected, due to the higher yield for the three synthesis. In the case of silver nanospheres synthesis, a cellulose capping also showed promising results. In order to optimize and increase the yield of the synthesis process, other parameters were tested such as the order of addition of reagents, the concentrations of gold and silver, reaction time and concentration of the capping.

Additionally, processes of purification of nanoparticles were conducted in order to remove the excess of capping agent for further functionalization with thiol bearing molecules^[4]. The formation of the synthesized particles was studied by UV-VIS spectroscopy and their morphology and size was evaluated by electronic microscopy transmission (TEM), DLS and zeta potential.

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Determination of diltiazem by stripping voltammetry using bismuth film electrodes

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Voltammetric techniques are attractive in the determination of pharmaceutical products in biological samples, as they can achieve low detection limits, with a high selectivity and low cost of implementation [1].

For many years mercury film electrodes (MFEs) were the choice in stripping voltammetry of trace metals owing to their high sensitivity, reproducibility, and renewability [2-4]. However, recently, bismuth film electrodes (BFEs) appeared as an attractive alternative, exhibiting negligible toxicity to the environment [2-5]. A survey of the literature revealed that BFEs have been applied to the determination of metals in different matrices, with few studies involving the quantification of organic compounds [4,5].

In this study is proposed a methodology based on stripping voltammetry with BFEs, applied to the determination of an antihypertensive agent: diltiazem.

The BFE was optimised in order to achieve its analytical efficiency. A plating potential of -1.4 V in a solution of 5 mg L⁻¹ Bi in 0.1 M acetate buffer (pH 4.5) for 90 s yields a suitable electrode.

The determination of diltiazem was performed by square wave cathodic stripping voltammetry in 0.25 M phosphate buffer (pH 7.4) at the BFE, in the concentration range of 2 x 10⁻⁷ M to 2 x 10⁻⁶ M. The cathodic peak was observed at -1.6 V vs. Ag/AgCl. The reproducibility of the signal, characterized by the relative standard deviation, was found to be less than 5 %.

Acknowledgement: One of us (J. Lopes) thanks FCT for a BII grant (BII/REQUIMTE/GABAI-8/2009).

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Portable and automatic micro-system for detection of glibenclamide

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*The authors had equal contribution to the developed work.

Glibenclamide, 5-chloro-N-[2-[4-(cyclohexylcarbamoylsulfamoyl) phenyl]ethyl]-2-methoxybenzamide, is a potent, second generation antidiabetic agent widely used to lower glucose levels in patients with type II non-insulin-dependent diabetes mellitus. In addition to classic overdosage due to suicide attempts, homicides with glibenclamide have been reported [1]. In fact, overdosages with glibenclamide can induce high sedation effects that can lead to conditions of lethargy. For this reason, glibenclamide can be used to incapacitate victims and commit Drug-Facilitated Crimes (DFC). Thus, the fast screening of such drug is imperative in terms of public health.

This work deals with the development of a portable, fast screening and automated microsystem for the detection and quantification of glibenclamide in pharmaceutical formulations and in spiked liquid samples, such as teas, juices or alcoholic beverages. The exploitation of the multipumping concept (MPFS) [2] allows implementing very compact and portable analytical systems, with high simplicity in automation and control, bringing together all the advantages associated to miniaturization.

The developed method was based on the fluorimetric monitoring of glibenclamide in acidic medium ($\lambda_{ex}=301$ nm; $\lambda_{em}=404$ nm), in the presence of an anionic surfactant (SDS), to enhance the fluorimetric measurements.

After optimization of all analytical parameters, a linear working response range for glibenclamide concentration up to 75 mg L⁻¹ was obtained. The calibration curve was represented by $FI = 0.0512 (\pm 0.0007) \times C_{\text{glibenclamide}} (\text{mg L}^{-1}) + 0.09 (\pm 0.03)$ with a correlation coefficient of 0.9992. Comparison of the results obtained in the determination of glibenclamide in five commercial pharmaceutical formulations by the proposed flow procedure, with the ones provided through a HPLC reference procedure, revealed a good agreement between both methods, with relative deviations comprised between -3.53 and 0.82%.

Further research in the area continues to allow the detection of glibenclamide in more complex matrices, like for example, juices and teas.

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Fat uptake by fried foods

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Fried foods are largely consumed in Portugal and in Western countries. While their organoleptic characteristics and easy preparation make them so popular, their association to a high caloric intake and, consequently, to overweight, obesity and other chronic diseases, raises some concerns.

In Portugal, sunflower oil is the main raw material used in frying, whether at home or in restaurants and catering, not only pure but also blended with other oils. Based on the less positive connotation of frying foods in vegetable oil, the aim of this work was to evaluate the fat incorporation in different food types during the frying process.

Domestic frying was simulated performing two daily frying cycles (lunch and dinner) in a deep-fryer, at 180 °C. The frying period of each cycle was 2 hours. For each assay, oil was previously heated for 1 hour and, then, fresh potatoes (in sticks), patties and fish sticks were separately fried.

In addition to fried food analyses (by official methodologies) regarding fat content (%) and moisture (%), the frying bath quality was also evaluated by determination of polar compounds as regulated in Portugal (up to 25%), being rejected after 5 days of use (18 hours of heating).

The results showed that the fat contents slightly vary during the frying process, but without a trend. The levels were 10-15%, for french-fried potatoes, 14-18%, for patties, and 10-12%, for fish sticks.

In conclusion, the life of the oil does not seem to directly affect the fat content of fried foods.

Binary and ternary complexes of Co(II) with 1,10 – phenanthroline and the antibiotics Norfloxacin, Ofloxacin and Enrofloxacin: Interaction with biomembrane models

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Fluoroquinolones are antibiotics that have a large spectrum of action against Gram negative and some Gram positive bacteria. Nowadays, one of the strategies to enhance their pharmacological behavior is the complexation of this fluoroquinolones with divalent metal ions since it can increase their activity and decreases their toxicity [1]. Fluoroquinolone metal complexes can also have different lipophilicity and better interaction with the DNA [2]. Ternary complexes of quinolones (with metal and 1,10 – phenanthroline) showed an increased activity when compared with binary complexes (with quinolone and metal) [3]. The interaction between these species and liposomes has been cited as a reference in the understanding of their diffusion through phospholipid bilayer. [4]

In this study, the stability constants of binary complexes of Co/Norfloxacin, Co/Ofloxacin and Co/Enrofloxacin and ternary complexes of Co/Norfloxacin/Phenanthroline, Co/Ofloxacin/Phenanthroline and Co/Enrofloxacin /Phenanthroline, have been determined using an automatic potentiometric system with an electrode sensible to hydrogen cation (25°C, I = 0,1M with NaCl and in argon atmosphere). These constants allow the drawing of the diagrams of distribution of species over the range of pH which gives information about the utility of these species as metallo-antibiotics. Interaction with biomembranar models, have also been performed. The partition coefficients (Kp) of Ofloxacin, Co/Norfloxacin and Co/Enrofloxacin with DMPC liposomes were determined by spectrofluorimetric methods (37°C and pH 7,4).

The results showed that the stability constants of the binary complexes are similar within the three antibiotics and that the stability constants of ternary complexes are significantly higher than those of the binary complexes. Interaction of the fluoroquinolones with liposomes evidenced that Co/Enrofloxacin has the higher partition to the lipidic phase (higher Kp), followed by Ofloxacin and Co/Norfloxacin, respectively.

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Spinel-Type Ferrite Nanoparticles: Synthesis and Magnetic Properties

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Colloidal magnetic nanoparticles are promising materials for numerous scientific and technological applications, such as biology, medicine, catalysis, magnetic sensors, data storage and magneto-optical devices, magnetic refrigeration and environmental remediation [1]. In particular, spinel-type ferrite nanoparticles (MFe_2O_4 , where M is a *d*-block transition metal) are of special interest since they combine the advantages inherent to nanosized materials with significant magnetization and stability against oxidation [2].

In this work, ferrite nanoparticles of the MFe_2O_4 -type (M=Co, Cu, Ni-Zn) were synthesized by the co-precipitation method [2]. The particles morphology, size, chemical and structural properties were characterized by transmission electron microscopy (TEM, Fig. 1), attenuated total reflection Fourier transform infrared spectroscopy and powder X-ray diffraction. The magnetic properties of MFe_2O_4 (M=Co, Cu or Ni-Zn) were studied in the range of 5-300 K by SQUID magnetometry. All the ferrite nanomaterials present sizes in the range of ~ 5-20 nm, are crystalline and display remarkable magnetic properties for the development of novel applications: $CoFe_2O_4$ nanoparticles are ferromagnetic at room temperature whereas $CuFe_2O_4$ and $Ni_xZn_{1-x}Fe_2O_4$ nanomaterials are superparamagnetic.

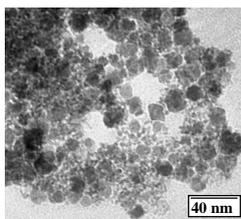


Fig. 1 – TEM micrograph of $Ni_xZn_{1-x}Fe_2O_4$ nanoparticles.

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Synthesis of Silica Nanoparticles with Hydro/Oleophobic and Thermal Insulation Properties

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In the era of Nanotechnology, the design of functional and technical textiles with improved properties is attracting growing interest, since the consumers increasingly demand products with better performances [1]. The incorporation of silica nanoparticles (SNPs) on fabrics is a promising route for the production of novel high performance textiles with superhydro/oleophobic and/or thermal insulating properties (Fig. 1) [1].

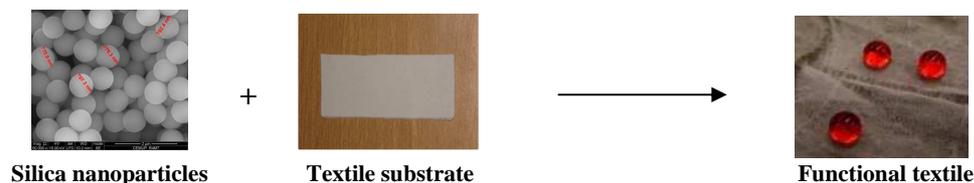


Fig. 1 – Schematic representation of textiles functionalization with SNPs.

This work reports the synthesis of different types of SNPs with hydro/oleophobic and/or thermal insulating properties, by two different methods.

The first methodology consisted on the simultaneous synthesis and functionalization of SNPs, in the presence of a template, by co-condensation of tetraethylorthosilicate and a variety of organosilanes containing hydro/oleophobic groups.

In the second approach, SNPs were synthesized using a different silica precursor without adding any template [2]. Monodispersed SNPs were prepared by sol-gel, following a two-step procedure: acid hydrolysis of the silica precursor followed by condensation in basic medium.

The functionalized SNPs were characterized by FTIR-ATR, SEM-EDS, TG and DLS. The hydrophobicity and oleophobicity properties were evaluated through contact angles measurements. These nanoparticles will be further incorporated onto textiles.

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Near infrared spectroscopy: a tool for diagnosing physical properties of pharmaceutical powders

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Pharmaceutical powders are described as heterogeneous systems with different physical and/or chemical composition with a range of particle size between a few micrometers to about a millimetre [1]. The powder flow behaviour is a key factor in a series of unit operations such as blending, compression, filling, transportation, and in scale-up operations [2]. Flowing properties of powdered solids depend strongly on their particle size and shape. Several techniques have been used to determine particle size distribution depending on the level of accuracy and precision to be reached [3]. Sieving is the simplest method to determine the particle size distribution. Samples are processed through a series of sieves of variable sieve opening sizes and the fraction of powder retained on each sieve recipient is weighted. However, this method is time consuming and needs specific equipment. Near infrared (NIR) spectra are affected by chemical and physical properties of powders, including particle size distributions [3]. To establish the potential of near infrared spectroscopy (NIRS) to determine the particle size distribution of pharmaceutical powders in a rapid and easy manner, blended powders based on paracetamol as the pharmaceutical active ingredient (API) were produced and analysed using the sieving method. Powders were also analysed by NIRS. The identified particle size distribution was modelled from the NIR spectra using partial least squares (PLS) and results were analysed in terms of figures of merit.

In a previous work, the flow properties angle of repose and bulk densities were successfully estimated using NIRS [4]. In this work, the latter were modelled from the NIR spectra and particle size distribution using PLS. The analysis of model results allowed the determination of the relative importance of NIRS and particle size distribution for modelling the important pharmaceutical physical properties angle of repose and bulk densities.

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Near infrared spectroscopy for polymorphism characterization and quantification in pharmaceutical solid dosage forms

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This work aims at developing high-throughput spectroscopic methods for polymorphisms characterization and quantification in pharmaceutical solid dosage forms (SDFs) within the process analytical technology (PAT) framework. Near infrared spectroscopy (NIRS) was used as the analytical method since it can provide chemical and physical information in real-time, be implemented in-situ, provide high-throughput measurements, is cost effective and robust enough for industrial usage. The main motivations for this project are: 1) the need for faster and effective tools for polymorphism characterization of SDFs by the pharmaceutical industry, 2) the lack of NIRS systematic studies of spectroscopic based methods for polymorphism characterization of pharmaceutical SDFs and 3) to take advantage of the existing leading-edge know-how in Portugal, mainly in the areas of chemical solid-state characterization and PAT technology for the benefit of the Portuguese pharmaceutical cluster growing sector [1]. The pharmaceutical production process of SDFs may result in changes in the crystalline structure of materials. Examples of severe consequences are known, as the sudden appearance of new polymorphs in pharmaceutical products during production [2]. These situations are expected to occur more often, since in the context of the drug discovery process, combinatorial chemistry generates increasingly larger molecules, which often show extensive polymorphism and poor aqueous solubility [3]. Cacao butter is used in the food, cosmetic and pharmaceutical industry. The cacao butter has four different polymorphic forms with a melting temperature range between 17°C and 37°C. Due to the large range of polymorphic forms and the need of better understanding and control of these forms the cacao butter was used as a case study for this analysis. NIRS spectra were collected from commercial cacao butter tablets and after melting under different cooling conditions. Samples spectra were analysed using principal component analysis (PCA) with the objective of differentiating the different polymorphic forms aroused from the thermal treatment. Differential scanning calorimetry (DSC) was used as the reference method.

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Tropical Disease Research: New Times, New Trends

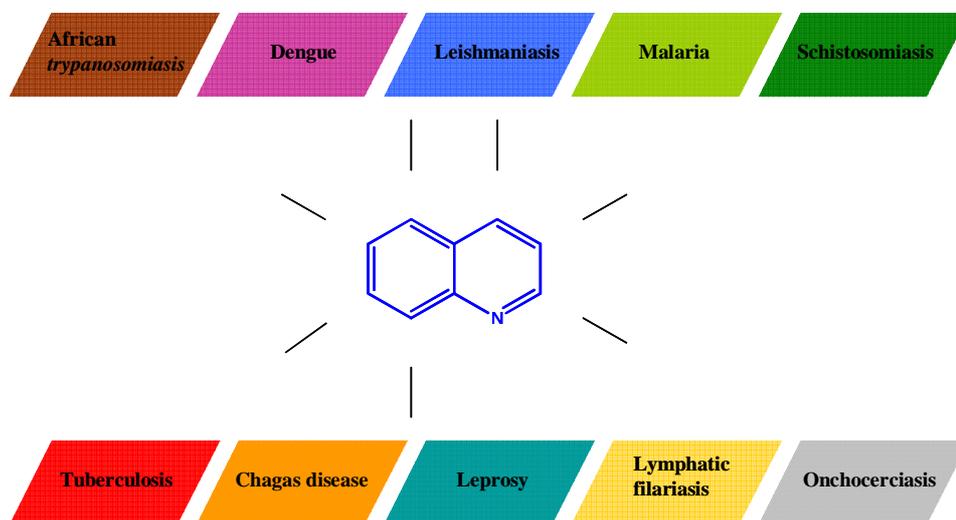
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The World Health Organization estimates that one sixth of the World's population is suffering from neglected tropical diseases. The precarious life conditions, the social disorganization and the lack of an effective political action and educational programs contribute to the persistence of these diseases in the poorest regions of the World [1].

The quinoline ring is an important scaffold in both Medicinal and Synthetic Organic Chemistry, being found in a large number of natural products, many of them with important biological activities. In malaria alone, quinolines are found in either blood-schizontocidal agents (4-aminoquinolines used against *P. falciparum*, the major responsible for malaria-derived deaths in Sub-Saharan Africa) or tissue-schizontocidal/transmission-blocking agents (8-aminoquinolines useful against *P. vivax*, the main responsible for the high-morbidity/morbidity due to relapsing malaria in Asia). Our group is devoting an intense research work to obtain new quinoline-based compounds (Imidazoquinolines) with antimalarial and *Pneumocystis carinii* activities. Preliminary studies with a subset of such Imidazoquinolines showed them to both block transmission of *P. berghei* malaria from mouse to mosquito and be highly stable toward hydrolysis at physiological conditions [2]. Moreover, some of these compounds were found to be active against the opportunistic fungus *P. carinii*, the causative agent of pneumocystic pneumonia [2]. In this communication we intend to highlight the importance of quinoline compounds in Medicinal Chemistry, with emphasis on tropical diseases like malaria.



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Kinetic study of the formation of gold nanotriangles using a novel photocatalytic method

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Anisotropic nanoparticles (NPs) have unique size and shape dependent properties, with possible applications in many areas of science and technology.^[1] It is thus important to understand the mechanism that controls the anisotropic growth, in order to be able to rationally develop better synthetic methods. Two main steps can be considered regarding the formation of these triangular gold NPs: a slow nucleation stage followed by a fast growth by reduction of Au³⁺ on the surface of the formed Au seeds.

We have synthesized Au nanotriangles using a gold metallic precursor (HAuCl₄), triethanolamine (TEA), hexadecyltrimethylammonium bromide (CTAB) as a capping agent and tin (IV) porphyrin (SnP) as a photocatalyst, in aqueous solution.^[2] Previous work in our research group showed that the concentration of SnP and CTAB strongly influence the rate of formation and shape of the NPs obtained. Therefore, in this work, the influence of these two factors was studied regarding the kinetics of the nucleation and growth of gold nanotriangles, in order to accomplish greater control over their final dimensions.^[3]

The time evolution of this reaction was studied by UV/Vis spectroscopy and the final morphological characterization of nanotriangles was performed by TEM. Absorbance values at a fixed wavelength corresponding to the plasmon peak maximum were plotted versus time in order to visualize and separate the events of nucleation and growth. The time at which the growth phase starts (t_{growth}) was determined and correlated with capping agent concentration and the results show that increasing CTAB concentration increases the t_{growth} . Therefore higher capping concentrations promote a smaller duration of the growth stage resulting in smaller sized nanotriangles.

Also further studies are needed to verify the influence of the photocatalyst in the growth and nucleation stage duration. These studies are fundamental to clarify the mechanism of formation of gold nanotriangles by this method.

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Activity and inhibition of bee venom phospholipase A₂ studied by fluorescent methodologies

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Phospholipase A₂ (PLA₂), a water-soluble enzyme that hydrolyses the sn-2 ester bonds of enantiomeric L-phospholipids, is involved in the release of prostaglandines, leukotrienes and thromboxanes [1] by acting on the beginning of the inflammatory cascade. Because of its role in the production of pro-inflammatory mediators and consequently in the inflammatory response developed by the cell, PLA₂ enzymes became a possible target when considering the design of new anti-inflammatory drugs with higher specificity in their mode of action. Acting on an early stage of the inflammatory process by inhibiting the release of arachidonic acid from the cellular membranes, the production of pro-inflammatory molecules can be modulated. One group of interesting compounds described with a broad spectrum of biological activities is the chemical family of xanthone derivatives (**Fig. 1**) [2].

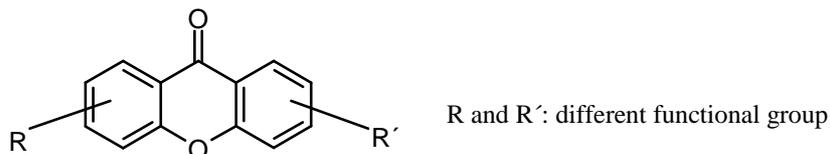


Fig. 1 Schematic representation of a xanthone derivative.

In this study, the interaction of two xanthone derivatives obtained by synthesis, with a PLA₂ from bee venom (bvPLA₂) and their inhibitory capacity towards the enzyme were evaluated. Considering the fact that although water-soluble, this enzyme acts at the lipid/water interface and its activity can be regulated by membrane composition, biomembrane model systems composed of EPC + 20% DPPG, were used for mimicking the cellular membranes and consequently simplify the interpretation of the final results. The methodology applied in this work is based on a fluorescent probe, ADIFAB (AcryloDated Intestinal Fatty Acid Binding protein), that allows the determination of free fatty acids produced as a result of the PLA₂ activity over the biomembranes. The probe fluorescence was followed at 432 nm and the decrease in the fatty acid concentration produced over time after contact between the enzyme and the tested drugs reflected the PLA₂ inhibition.

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Determining drug-serum protein binding interaction

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Studies on the binding of drugs to proteins are of great importance in biological, biomedical and pharmaceutical sciences. This binding is particularly important because it affects both the activity of drugs and their availability. Human serum albumin (HSA) is the most abundant protein in blood plasma. Its main physiological function consists in the storage and transportation of a wide range of endogenous and exogenous compounds. The physiological importance of HSA and the relative ease with which it can be isolated and purified on a large scale, determined the usefulness of HSA as a model protein for the study of ligand-protein interactions.

A variety of techniques have been used for protein binding measurements including dialysis, ultrafiltration, circular dichroism, spectrophotometry, and extrinsic fluorescence. Here we use the intrinsic fluorescence method to evaluate the binding of the drugs to HSA.

HSA has three intrinsic fluorophores: tryptophan, tyrosine and phenylalanine. In general, the intrinsic fluorescence of HSA is practically conferred by tryptophan alone because phenylalanine has a very low quantum yield and the fluorescence of tyrosine is almost totally quenched if it is near an aminogroup or a tryptophan. The HSA intrinsic fluorescence can be decreased by a variety of molecular interactions with quencher molecules.

In this regard, the work presented consisted in quenching studies of HSA intrinsic fluorescence by meloxicam and nimesulide which are two non-steroidal anti-inflammatory drugs (NSAIDs). By the application of mathematical models it was possible to evaluate the nature of quenching and determine the binding capacity of the NSAIDs tested to HSA.

Catalytic synthesis of indigo and indirubin pigments

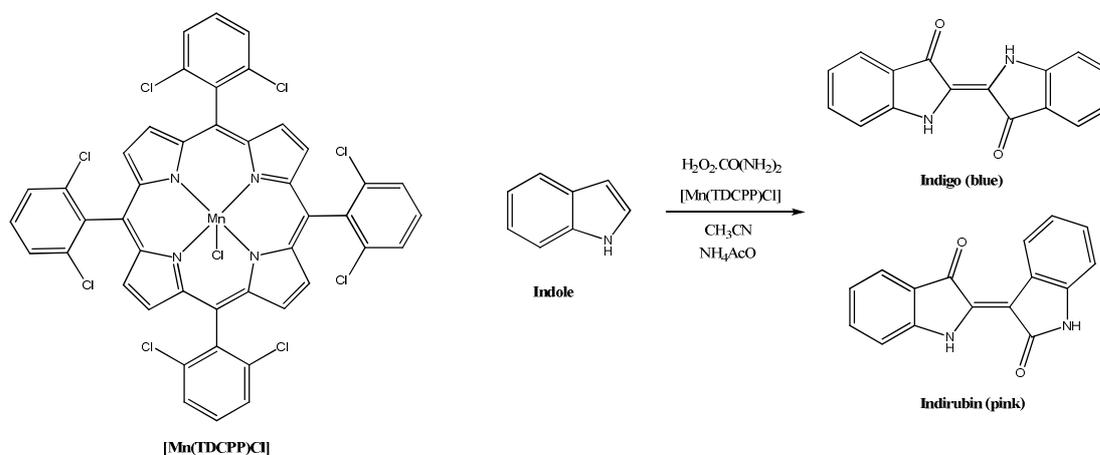
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Indigo is considered to be the oldest dye, with applications known since ancient times till our days in the dyeing of the modern blue jeans. Initially, indigo was extracted from various species of plants, while after its first chemical synthesis in 1978, its production was completely industrialized. More recently, bacterial systems have been engineered and used for commercial indigo production. [1]

The enzymology underlying indole metabolism has been studied *in vivo* and *in vitro*, several works have described the oxidation of indole with production of indigo and indirubin pigments in the presence of cytochrome P450 mono-oxygenases.

In the last decades, several biomimetic approaches to cytochrome P450 activity were developed based on synthetic metalloporphyrins. The use of robust and easily obtainable metalloporphyrins as catalysts and of hydrogen peroxide as the oxidant have led to efficient and ecologically clean procedures to perform many oxidative reactions. [2]



In the present work, the oxidation of indole with hydrogen peroxide in the presence of [Mn(TDCPP)Cl] is described. The indigo and indirubin pigments were isolated and characterized by UV/Vis, ¹H and ¹³C NMR spectroscopies and mass spectrometry.

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Synthesis of analogues of rasagiline: a contribution to derivatising neuroprotective

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Currently, existing therapies for treating Parkinson's and Alzheimer's are still well below the expectations of patients and physicians. Therefore, the design of new neuroprotective therapeutic agents is a critical challenge to improve the effectiveness of existing drugs and to introduce new alternative therapies.

Rasagiline, *N*-propargyl-1-(*R*)-aminoindan, has an important neuroprotective activity applicable to the treatment of neurodegenerative diseases, such as those mentioned above.

This work had as its purpose the synthesis of new isosterics of rasagiline, derived from pyridine with nitrogen in *ortho*, *meta* or *para* positions, replaced or not the pentacyclic ring, to be subjected to neuroprotective biological evaluation and to establish its potential activity anti-Parkinson and/or anti-Alzheimer's.

From commercial 6,7-dihydro-5*H*-cyclopenta[*b*]pyridine [1], it was possible to synthesize the isosteric *ortho* of rasagiline, (\pm) *N*-(prop-2-ynyl)-6,7-dihydro-5*H*-cyclopenta[*b*]pyridin-7-amine, following 5 steps: (i) *N*-oxidation; (ii) α -acetylation-deoxygenation; (iii) hydrolysis; (iv) mesylation and (v) replacement (Fig. 1).

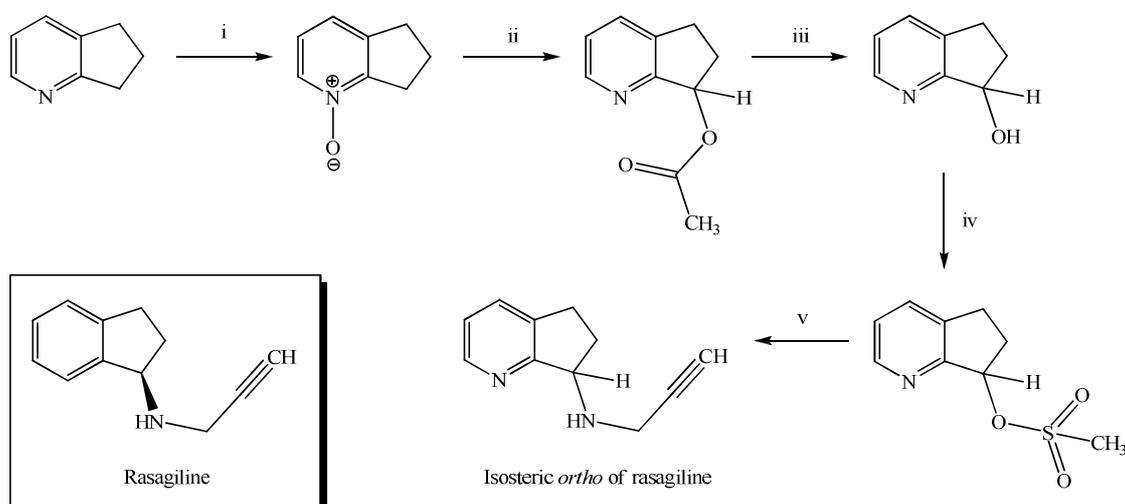


Fig. 1. Methodology for synthesis of isosteric *ortho* of rasagiline.

References:

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Energetic study of fluorene

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Polycyclic aromatic hydrocarbons (PAHs) and some of their derivatives represent a complex group of important environmental pollutants, originated by a wide variety of natural and anthropogenic sources, and constitute a class of compounds with relevant negative impact for health [1]. On the other hand, PAHs are having an increasing interest on the field of organic electronics due to their good performance as active components in a new generation of electronic devices, as organic light-emitting diodes and organic photovoltaic cells.

In order to correlate molecular energetic data with the structural characteristics of the molecules, experimental and computational thermochemical studies of different classes of aromatic compounds have been, for a long time, one of the aims of our Research Group. The lack of reliable energetic data for polycyclic aromatic hydrocarbons (PAHs) and their derivatives justifies our attention to the present theme, involving the study of thermodynamic properties of fluorene and its derivatives, in order to get key values not available from the literature.

As the purification of these compounds is difficult, so only the fluorene has been purified with enough purity to perform the thermochemical measurements. We will now report the corresponding energy of combustion, obtained from static bomb calorimetry, and the derived value of the crystalline standard molar enthalpy of formation.

The vapour pressures of fluorene will be measured in the near future, as a function of the temperature, using the method [2], from which the standard molar enthalpy of sublimation, at $T = 298.15$ K, will be derived using the Clarke-Glew equation. The combination of the values of standard molar enthalpy of formation in the crystalline phase with the standard molar enthalpy of sublimation, will allow the calculation of the standard molar enthalpy of formation of fluorene, in the gaseous phase, at $T = 298.15$ K.

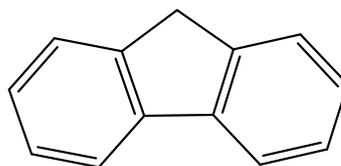


Figure 1 – Chemical structure of fluorene

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Acknowledgments:

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The Phase Diagram of 9-Fluorenone near the Triple Point

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The OFET (organic field effect transistors) performances of several molecules containing a 9-fluorenone (CAS n. 486-25-9) core have been recently investigated.¹ The success of the application of these materials in the modern field of organic electronics depends on several structural properties like the packing closeness, the film morphology and the volatility of the solid phase.

In this study, the vapour pressures of both solid and liquid 9-Fluorenone were measured in the temperature interval (319.87 – 440.85) K, using a static apparatus equipped with MKS Baratron absolute gauges.² From the experimental results, the standard molar Gibbs energies, enthalpies and entropies of sublimation and of vaporization, at $T = 298.15$ K, and the triple point p, T coordinates were derived. The temperature and molar enthalpy of fusion were derived from the vapour pressure results and were also determined directly using differential scanning calorimetry. The phase diagram of 9-Fluorenone near the triple point will be presented.

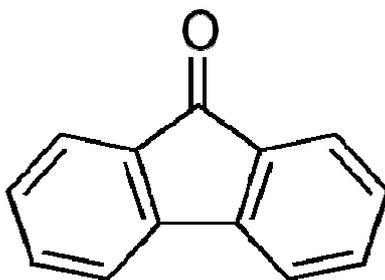


Fig. 2 – 9-Fluorenone

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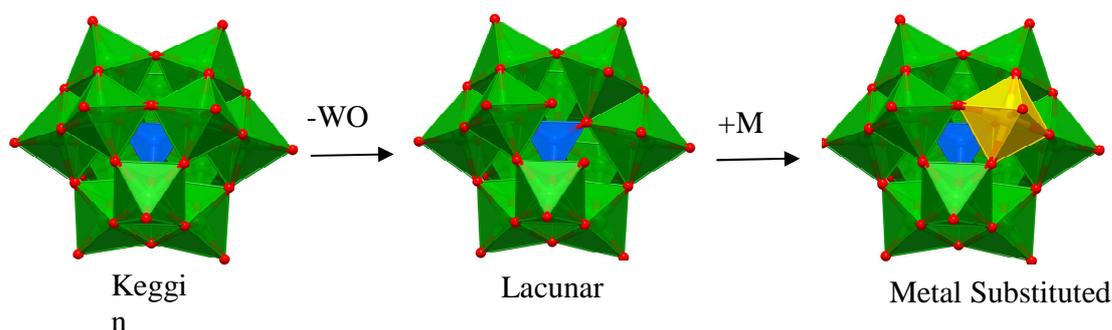
Polyoxometalates: Electrochemical Studies and Incorporation in Layer-by-Layer Multilayer Films

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Polyoxometalates (POMs) are a novel highly versatile and modifiable class of compounds [1,2]. They have applications in several areas, such as catalysis, molecular conduction, magnetism, medicine, luminescence, as well as materials science. These applications are due to the high charges, ionic weights and a rich redox chemistry[3]. Due to their electrochromic and photocromic properties the design and preparation of ultra-thin film materials incorporating POMs for optical applications is a current challenge [4].

POMs are structurally diverse anionic clusters consisting of d^0 metal cation and oxygen anions arranged in MO_6 octahedral units. The metal substituted POMs, $[XM(H_2O)W_{11}O_{39}]^{m-}$, where **M** is a transition metal and **X** is a tetrahedrally coordinated heteroatom, are of special interest because a change in the heteroatom, X, and/or M, can fine tune their redox potential without affecting the structure. The metal substituted POMs are derived from Keggin anion $[XW_{12}O_{40}]^{m-}$ in which one of the W^{VI} metal and its terminally bound oxo group are missing, creating the lacunar POM [3].



In the present work, the lacunar $[SiW_{11}O_{39}]^{8-}$ and substituted POMs, $[SiM(H_2O)W_{11}O_{39}]^{6-}$, **M**=Co(II) and Ni(II) were prepared and characterized. Using cyclic voltammetry, the redox behaviour of the lacunar anion with metal substituted POM and the influence of incorporating different metal transition ions in tungsten redox potentials were evaluated. The POMs were also used to fabricate multilayer films by layer-by-layer self-assembly method; the film buildup was monitored by UV-vis spectroscopy.

Acknowledgements: This work was partially funded by Projecto de Investigação Científica na Pré-Graduação 2009, U.P. and Santander Totta.

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Straightforward VIRTUAL SCREENING protocol using AUTODOCK and VMD

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Molecular docking of biomolecules is becoming an increasingly important part in the process of developing new drugs, as well as, searching compound databases for promising drug candidates. There are many programs available in the market that have been successfully used in a myriad of keystone problems, however, as commonly happens with most of the scientific software, the programs are very complex and a deep knowledge is required for the common user to do standard steps[1]. This is an obstacle and a cornerstone issue for the research teams in the fields of Chemistry and the Life Sciences who are interested in conducting this kind of calculations but, do not have enough programming skills [2]. To overcome these limitations, we have designed vsLab, an easy-to-use graphical interface for AutoGrid/AutoDock that has been included into VMD as a plug-in [3]. This program allows almost anyone to use AutoDock and AutoGrid for simple docking or for virtual screening campaigns without requiring any previous knowledge concerning these techniques. The potential associated to this software makes it an attractive choice for educational purposes, but also for more advanced users that can use vsLab to increase workflow and productivity of everyday tasks (Figure 1).

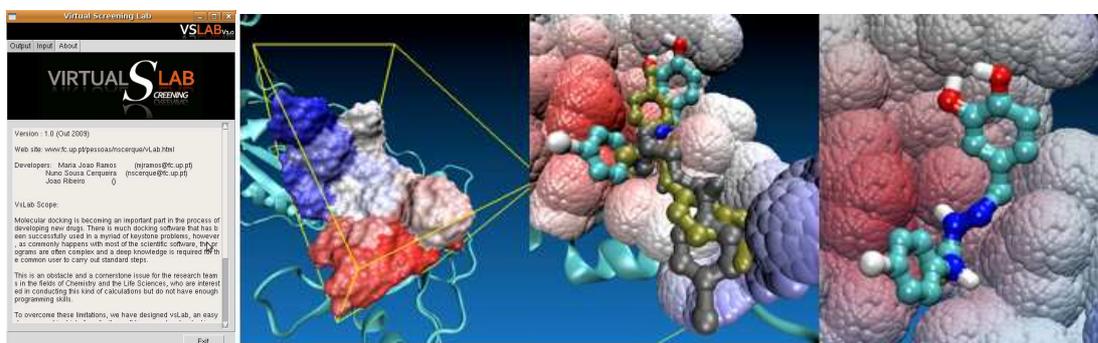


Figure 1: VsLab in action

Website: <http://www.fc.up.pt/pessoas/nscerque/vsLab/vLab/HomePage.html>

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Inhibition of cyclooxygenases by new indole derivatives

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The pharmacological effects of classical nonsteroidal anti-inflammatory drugs (NSAIDs) involve the inhibition of cyclooxygenase enzymes (COXs), which exist in two isoforms: COX-1 and COX-2. However, it has been suggested that the anti-inflammatory and analgesic properties of these drugs are related to the inhibition of COX-2, whereas their ulcerogenic side effects are associated with the inhibition of COX-1. Thus, selective inhibition of COX-2 over COX-1 may be advantageous for the treatment of inflammation and inflammation-associated disorders with reduced gastro-intestinal toxicity.

Indole is a privileged structure and constitutes an important template for the design of NSAIDs (e.g. indomethacin). Thus, the aim of this study was to evaluate the capacity of several new indole derivatives to inhibit COX-1 and COX-2.

The prepared indole library (Fig. 1) was screened and the results obtained show that all the compounds have COX-2 inhibitory effects at the concentration of 100 μ M. The same was observed for COX-1, except with one compound which was unable to inhibit this isoenzyme in the tested concentrations.

In conclusion, the tested library revealed promising compounds for the development of selective COX-2 inhibitors. These results are now being used for the design and development of new anti-inflammatory drugs.

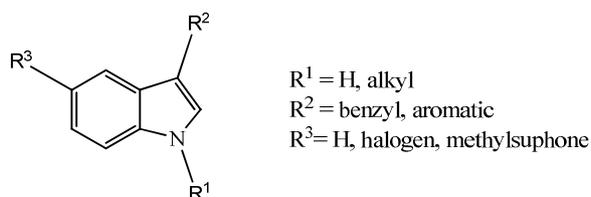


Fig. 1 – Substitution pattern of the prepared indole library

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Viability of Biodiesel Production from Fish Oils

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Biodiesel fuel has been gaining some attention as a worthy alternative to petroleum fuel for some time now. It is both clean burning and produced with renewable resources such as animal fats or simple vegetable oils. However, while edible vegetable oils can be also used for human consumption, animal fats such as tallow or fish oils are by-products from the meat and fish processing industries. The complete valorization of these wastes is a high priority, not only because of the high quantities generated, but also, since they represent an economic and environmental problem. Therefore this work aims to evaluate the use of fish oils extracted from fish heads and viscera as feedstock for biodiesel production.

The types of fish oil evaluated in this work include sardine oil, a mixture of oils from several types of fish and a mixture of sardine and tuna fish oil supplied by the Portuguese company named SAVINOR SA. After the oil extraction from the fish processing residues, biodiesel was produced by transesterification reaction.

The acid value is one of the most important parameters when characterizing the oil, since it allows one to evaluate which method for biodiesel production is more adequate. For example, depending on the acidity level one can make a direct transesterification or if the fish oil presents an acid value above $6\text{mg}_{\text{KOH}}/\text{g}_{\text{sample}}$ it is required to perform previous oil pre-treatment through an esterification reaction in order to convert the free fatty acids into esters followed by transesterification [1, 2].

In this work the acid value of the various samples was determined at different esterification operating conditions of temperature and reaction times, showing a general decrease in acid value as the reaction time increases. Other parameters such as the kinematic viscosity, density and heat capacity of the several oils and biodiesel samples were also determined. The preliminary results obtained allow one to conclude about the feasibility of producing biodiesel from waste fish oil.

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Computational Parameterization of Cytochrome P450 inhibitors for Molecular Dynamics Simulations

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Cytochromes P450 (CYP) are a diverse group of enzymes found in all domains of life that use a large number of small and large molecules as substrates in enzymatic reactions. In humans, CYPs metabolize thousands of endogenous and exogenous compounds. Most CYPs can metabolize multiple substrates, and many can catalyze multiple reactions, features that account for their central importance in metabolizing the extremely large number of endogenous and exogenous molecules. In fact, CYPs are the major enzymes involved in drug metabolism and bioactivation, accounting for ca. 75% of the total metabolism [1]. The interaction of small organic molecules and inhibitors with CYPs is therefore of high biological relevance [2,3].

Here we describe the computational parameterization of a total of 185 inhibitors of the CYP1A1, CYP1A2, CYP2A6, and CYP1B1 families for accurate molecular dynamics simulations of the interactions between these compounds and CYPs. The parameters obtained include bond-lengths, angles, and dihedrals and corresponding force constants, and van der Waals parameters extracted from the General AMBER force field database. In addition, atomic charges calculated at the HF/6-31G(d) level were also determined with the RESP methodology.

A database containing all these parameters and complemented with the available IC₅₀ values for corresponding CYPs is currently in preparation, allowing a variety of detailed computational-based approaches on CYPs-interaction to be performed with increased accuracy and speed.

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Flow-injection analysis of sulphites in wine with spectrophotometric detection

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'Sulphites' is a general term used to describe sulphur-based substances that have been widely used as preservatives in the wine industry. They include sulphur dioxide (SO₂, E220) and its source compounds, such as sodium and potassium bisulphite. Sulphites are antioxidant and antimicrobial agents; enzyme inhibitors; they can act as bleaching agents and as taste preservatives by inactivating strong flavoured compounds. Being so comprehensive and cheap its use is generalized. However, when overdosed, not only is released a characteristic unpleasant aroma and taste but also becomes a health threat still not fully understood. Health organizations (e.g. WHO) now recommend their use reduction and even replacement. Therefore the quantification of sulphites is vital for consumer safety and to comply with legal impositions.

We propose a new automatic analytical methodology based in a FIA (Flow Injection Analysis) system that includes: a) analyte extraction and b) on-line spectrophotometric detection.

a) Extraction is performed by means of an on-line gas-diffusion module. The wine samples flow in the module's lower chamber, while an accepting buffer solution flows in the upper chamber; a semipermeable hydrophobic membrane, that allows SO₂ passage, separates both chambers.

b) The on-line instrumental detection is performed by a miniature fiber optic spectrophotometer.

The acceptor solution contains malachite green, therefore sulphite quantification is obtained by color decrease a compound that reacts with SO₂ producing an uncolored product.

Gas-diffusion extraction module (GDEM) for the analysis of volatiles and semi-volatiles compounds. Application in the analysis of diacetyl in wine

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In this work a novel extraction approach for volatile and semi-volatile compounds is presented (Fig.1). The gas-diffusion extraction module (GDEM) consists in a Teflon module of our own design with a microporous hydrophobic membrane (PTFE) at its bottom that, due to its hydrophobicity avoids the diffusion of the aqueous solvent but allows the passage of volatile compounds [1]. Inside the module it is placed a small volume of an acceptor solution, which is collected and analysed at the end of the extraction. It is a very precise system as well as robust and reproducible; furthermore it has very low reagent consumption. By means of a derivatizing reaction, simultaneous extraction and concentration of the analyte is achieved allowing a simple instrumental detection. Sampling times are in the minute time span and little operator intervention is required during the process. Moreover, since it is very small and easy to operate it is ideal for in-situ sampling. It is also very versatile: it can be used with many analytes, matrices and many kinds of analytical instruments like HPLC, GC or voltammetry.

This extraction module was applied as a sampling preparation tool in the HPLC-UV determination of diacetyl in wine samples. The module is immersed in the wine sample in agitation at room temperature. Inside the module a solution of o-phenylenediamine (derivatizing agent) in phosphate buffer 0.1 M, pH 7 is placed. After 10 minutes of extraction this solution, containing the extracted and derivatized diacetyl, is collected and injected in the chromatographic system. With this methodology it's possible to quantify the total diacetyl and the free diacetyl content in wine samples.

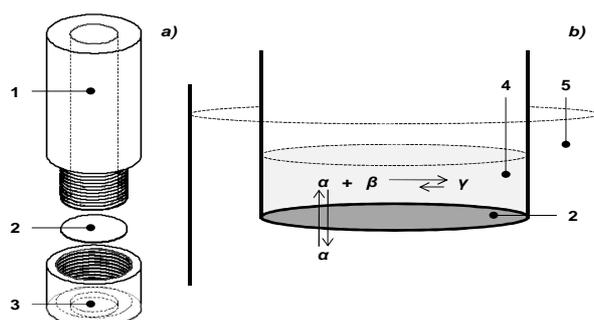


Figure 1. a) GDEM and b) detail of the extraction with a derivatizing reaction. 1 – extractor's superior piece, 2 – hydrophobic membrane, 3 – extractor's lower piece, 4 – acceptor solution, 5 – donor solution, α – analyte, β – derivatizing agent, γ – derivatized species

[1] PATENT PT104789 (2009)

Novel catalysts: metal complexes immobilized into Bingel functionalized carbon nanotubes

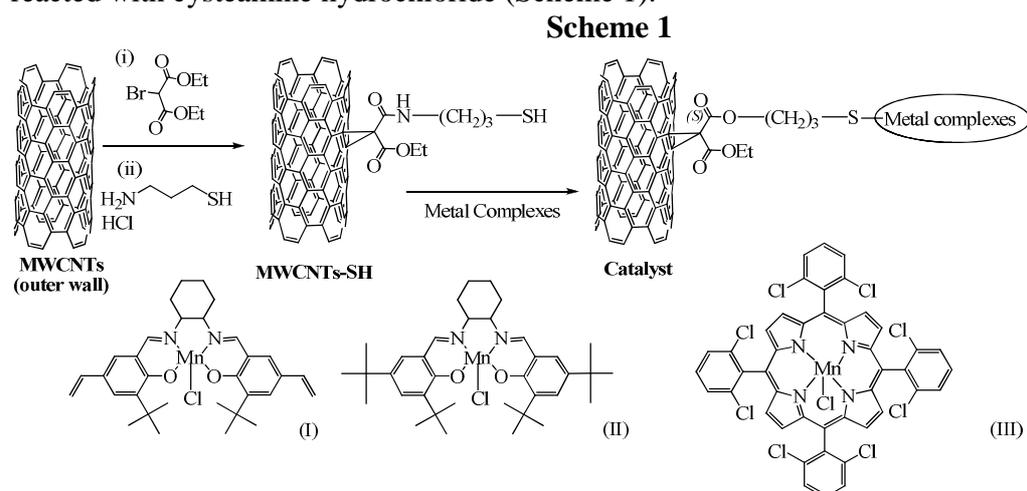
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The use of carbon nanotubes (CNTs) as catalysts and catalyst supports is a current research area with excellent results. Such materials offer some advantages over conventional supports due to their electronic properties and nanosized dimensions that will enhance adsorption and thus chemical reactivity [1]. In this work, the functionalization of multi-walled carbon nanotubes (MWCNTs) by the Bingel reaction is described, using malonate derivatives in the presence of a base such as DBU [2]. The MWCNTs formed in the Bingel reaction were further reacted with cysteamine hydrochloride (Scheme 1).



In order to prepare efficient heterogeneous catalysts, the material MWCNTs-SH was reacted with complex (I) in the presence of a radical initiator (AIBN) for formation of a thioether linkage, and with complexes (II) and (III) for axial coordination in the presence of a base.

Characterization of ligands and corresponding metal complexes was performed by NMR and mass spectrometry, respectively. Carbon materials and heterogeneous catalysts were characterized by XPS, FTIR and Raman.

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Systematic Development of Molecular Dynamics Parameters for the Computational Modelling of Farnesyltransferase Inhibitors

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Farnesyltransferase (FTase) is an important metalloenzyme that catalyses the addition of a farnesyl group from farnesyl diphosphate (FPP), to a cysteine residue of a protein substrate containing a typical -CAAX motif at the carboxyl terminus, where C represents a cysteine residue [1-3]. FTase inhibition evolved as a promising strategic approach to tackle several diseases including cancer, malaria, Chagas disease, African sleeping sickness, Toxoplasmosis, Leishmaniasis, progeria and tuberous sclerosis. Presently more than 500 patents describing FTase inhibitors have been reported [4], a number that makes this enzyme a very important target in drug design and development efforts. In particular, Molecular dynamics simulations are a very powerful tool that allows the computational evaluation of the interaction of inhibitors with the target protein, with atomic level detail and including important features such as solvation and dynamic effects.

In this communication we report the systematic parameterization of a total of 234 FTase inhibitors for use with the well-established AMBER biomolecular force field. Parameters created include the bond-lengths, angles, and dihedrals and corresponding force constants, and van der Waals parameters extracted from the General AMBER force field database. In addition, atomic charges calculated at the HF/6-31G(d) level were also determined with the RESP methodology.

A database containing all these parameters and complemented with the available IC50 values for FTase is currently in preparation, allowing a variety of detailed computational-based approaches on FTase-inhibition to be performed with increased accuracy and speed.

Acknowledgments: FCT (BII/REQUIMTE/GQC/2008)

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Determination of Molecular Mechanical Parameters for the Description of Ribonucleotide Reductase Inhibitors in Molecular Dynamics Simulations

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Ribonucleotide reductase (RNR) is the enzyme that catalyzes the formation of deoxyribonucleotides from ribonucleotides, which are required for the synthesis of DNA. As DNA replication and repair are dependent of the availability of deoxyribonucleotides, the inhibition of this enzyme became one of the most attractive targets for anti-tumour, anti-viral and anti-bacterial therapies [1-3].

Molecular dynamics (MD) simulations are a very effective tool to evaluate computationally the interactions between inhibitors and their corresponding protein or enzyme targets. This technique allows the inclusion of solvation and dynamic effects into the analysis of protein-ligand binding, complementing the static picture given by X-ray crystallography. While MD simulation of proteins has become a standard approach in computational biochemistry using common biomolecular force fields that include accurate parameters for all the standard amino acid residues, the treatment of inhibitors is generally more complicated. In fact, the uniqueness of each molecule leaves to the user the heavy burden of parameterization.

Here we report the systematic parameterization of a total of 26 RNR inhibitors for use with the well-established AMBER biomolecular force field. Parameters created include the bond-lengths, angles, and dihedrals and corresponding force constants, and van der Waals parameters extracted from the General AMBER force field database. In addition, atomic charges calculated at the HF/6-31G(d) level were also determined with the RESP methodology.

A database containing all these parameters and complemented with the available IC₅₀ values for RNR is currently in preparation, allowing a variety of detailed computational-based approaches on RNR-inhibition to be performed with increased accuracy and speed.

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Chromatographic determination of riboflavin in foodstuff using a reversed-phase monolithic column

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Riboflavin is a water soluble vitamin that is obtained through dietary intake [1] hence it is commonly added during the manufacturing of fortified foods, particularly milk and milk based formulas. Furthermore, due to its fast photodegradation during preparation, preservation and storage [2], riboflavin content is a key parameter in the quality control of fortified foods, requiring suitable methods for routine control.

In this context, the present work had the purpose of developing a chromatographic method for determination of riboflavin in food samples using a monolithic reversed-phase column. Monolithic columns have been applied to liquid chromatography (LC) and they can be considered as a single large “particle” of porous material that fills entirely the column volume without any interparticular voids typical of packed columns. Because of their small-sized skeletons and wide through-pores, it is possible to attain higher separation efficiency when compared to particle-packed columns at a similar pressure drop. Hence, higher flow rates can be applied, rendering faster, efficient separations.

The analysis was performed in a LC equipment Merck/Hitachi LaChrom 7000 series, constituted by an interface (D-7000), a high-pressure pump (L-7455) and a diode array detector (L-7100) controlled by D-7000 software. A reversed-phase monolithic column Chromolith RP-18e (100 × 4.6 mm i.d.) (Merck) connected to a guard column of the same material (5 × 4.6 mm i.d.) was used as stationary phase. Separation was conducted by isocratic mode and the detection wavelength was set at 268 nm. Sample introduction was performed through a 200 µL loop made of 0.75 mm i. d. polyetheretherketone tubing was assembled to a Rheodyne 7725i six-port manual injector (IV).

Linear calibration curves were established (0.5 to 5.0 mg L⁻¹ of riboflavin) and the proposed chromatographic method was applied to reference certified material, originating results that were not statistically different from the certified values.

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Environmental alternative for cadmium: nano structural alloys of zinc and tin using ionic liquids.

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Electrodeposition of metals is essential for a variety of industries usually the process is carried out from aqueous solutions [1]. Tin- zinc electrodeposits offer a good corrosion protection and they have been deposited from a variety of aqueous baths including sulphate-tartrate [2], gluconate [3] and pyrophosphate baths. These electrodeposits combine the barrier protection of tin with the galvanic protection of zinc providing a ductile and corrosion resistant coating so, it is not surprising that a number of applications of tin-zinc alloy deposits have been known and well recognized [4].

Most recently the case of ionic liquids achieved the attention due to the possibility of depositing metal which cannot be deposited from aqueous solution such as Al, Ti... Another type of ionic liquids are those formed by mixing quaternary ammonium halides with suitable hydrogen bond donor (HBD) which decrease the freezing point (DES) [5].

On this work assessed the possibility of deposits of Sn, Zn and Sn-Zn alloys from DES prepared with choline chloride and different HBD: urea, ethylene glycol and 1,2-propylene glycol. Results will be shown that illustrates the influence of the liquid on the thermodynamics of electrodeposition using cyclic voltammetry performed with three electrode materials (Pt, GC and steel). The kinetic of deposition was also study using chronoamperometry. Fitting of the data was carried out using known models of nucleation and growth as illustrated in Fig. 1.

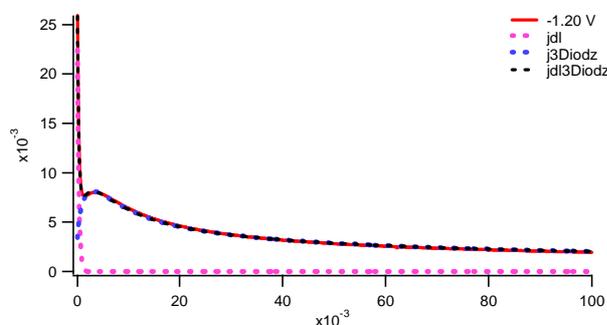


Fig. 1 Comparison of an experimental current density transient (—) recorded during Sn deposition on glass carbon electrode and a theoretical transient (—) obtained by non-linear fit.

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Development of a multicommutated flow system with chemiluminometric detection for the analysis of paracetamol

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Paracetamol (acetaminophen or *N*-acetyl-*p*-aminophenol) is a widely used antipyretic analgesic drug. For instance, in 2008 more than 3 million of packages of paracetamol were sold in Portugal [1]. Then, this pharmaceutically active substance and their metabolites may appear in wastewaters.

Chemiluminescence is a high sensitive analytical technique, with low detection limits that requires simple instrumentation. It is based on the measure of light intensity produced in a chemiluminometric reaction, which can be correlated with the concentration of any of the starting reagents [2]. When associated with continuous flow systems enables some advantages, because sample and reagents flow through manifold channels to the detector flow cell, where emitted light is monitored, thus allowing higher sample throughput and reduction on sample and reagents consumption [3]. In this context, multicommutation flow injection analysis (MCFIA) is an alternative to increase versatility of flow systems. This process has also other advantages, such as low reagent and sample consumption and robustness.

The aim of this work is to quantify paracetamol in wastewaters, using a multicommutated flow system with chemiluminometric detection, which is based in the oxidation of luminol by hypochlorite. In the presence of paracetamol, the hypochlorite's concentration is reduced since it oxidizes the amide group present in the chemical structure of paracetamol.

The optimization process was divided in two parts: optimization of chemical conditions and optimization of flow conditions. In the first part, parameters such as concentration and pH of hypochlorite and luminol were studied. After that, flow conditions were also tested. Finally, the proposed methodology will be applied to the analysis of paracetamol in hospital influents and effluents of Porto area.

Acknowledgments:

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A simple photometric flow cell detector using a RGB light emitting diode and a CMOS array detector

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A simple flow cell detector using a RGB light emitting diode (LED) as the light source and a CMOS detector was developed. The emitter and detector were integrated and fixed in a set of poly(methyl-metachrylate) PMMA blades making a flow detection cell in which the optical path between the LED and the CMOS detector is well known and can so be related with the light absorbed by the sample.

Voltage applied across the LED terminals was carefully controlled with the construction of a tension power supply of 5 V output. The logical activation of this power supply was made using a home-made TTL card with 5 V digital output in order to make possible the control of the LED by the microcomputer. Data acquisition was simply made by USB connection of the CMOS camera chip to the same microcomputer. Software platforms programmed in Visual Basic language made possible data acquisition and the control of the detection system.

The principle in which we relied in the application of this cell for sample analysis is that the chemical species to be quantified absorbs light in a maximum wavelength that can be associated with composition in three color components: Red, Green and Blue (RGB) specific for that wavelength. Light absorbed in each of these colors can then be related with the chemical species concentration from the LED spectrum and the CMOS chip camera calibration.

The presented cell allows the construction of a hand-made spectrophotometer with small size, automatic control of light source and data acquisition representing economical and innovating solution to the use of bulky and expensive conventional spectrophotometers.

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Theoretical and computational studies addressed to ornithine decarboxylase

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Ornithine Decarboxylase (ODC) is a pyridoxal 5'-phosphate dependent enzyme that catalyzes the first committed step in the biosynthesis of polyamines. The polyamines are a family of aliphatic amines that are essential for cellular maintenance, proliferation, differentiation and apoptosis, being involved in the synthesis and stabilization of DNA, RNA and proteins[1,2]. Additionally, they have antioxidants properties. They can function as radical scavengers of reactive oxygen species, and are involved in many signaling pathways through their effects on G proteins, protein kinases and nucleotide cyclases and receptors. Polyamine depletion has been shown to inhibit cell proliferation (both in vitro and in vivo) and cell migration. They are known to accumulate in many types of cancer cells and have been demonstrated to be necessary for neoplastic transformation and also angiogenesis, which itself is necessary for tumor growth and metastases. Therefore, the polyamine biosynthetic pathway may provide an important target for the development of agents that prevent carcinogenesis and tumor growth[3].

This communication presents the first insights about the catalytic mechanism of ODC. This work is under development and involves the use of theoretical and computational means to unravel the puzzling and enigmatic mechanism involved in the decarboxylation of ornithine to putrescine.

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Theoretical and computational studies addressed to asparaginase

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In the former 10 years, a variety of cancer-bearing patients have shown to suffer from disturbance in the amino acids catabolism. Interestingly, depending on the type of disease, abnormal high concentrations of specific amino acids were found in the blood serum. The concentration of these amino acids normalized to standard values when the tumor was removed, which means that this is a direct outcome of the disease that is required for the malignant tumor growth. Recent studies show that decreasing the concentration of the highly expressed amino acids can control or even annihilate the tumor growth, while the metabolism of normal cells is not affected. To starve cancer cells through amino acid deprivation has thus become an encouraging method in cancer therapy. In this context the metabolism of asparagines has a relevant role since it is highly required in several types of tumors and its depletion is the least toxic for the normal cells. However, restricted diet is not enough to control the concentration of these amino acids in the blood serum and key enzymes specifically addressed to handle this issue are current strategies[1].

Asparagine deprivation can be achieved with the use of parasite enzymes, such as Asparaginase. The use of this enzyme in patients has already been approved by the FDA in the treatment of acute lymphoblastic leukemia and a few sub-types of non-Hodgkin's lymphoma [2,3].

This present communication gives the first insights about the catalytic mechanism of Asparaginase. This work is under development and involves the use of theoretical and computational means to unravel the puzzling and enigmatic mechanism involved in the hydrolysis of asparagine to aspartic acid.

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Aza-Diels-Alder reaction between imines of chiral glyoxylates and cyclopentadiene: Contribution to the synthesis of bioactive heterocycles

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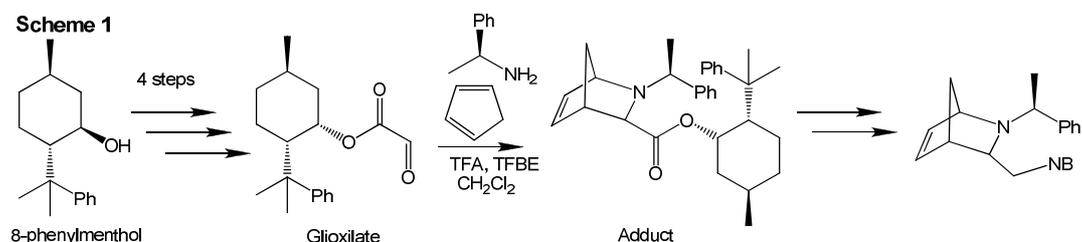
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The experimental study of synthetic methodologies for the preparation of a variety of enantiomerically pure pyrrolidine and / or piperidine derivatives (aza-sugars) with potential anti-viral or anti-neoplastic properties has been much explored in recent times. [1,2]

This work aims to study the aza-Diels-Alder reaction between benzilimines of chiral glyoxylates and cyclopentadiene as a contribution to the development of new synthetic precursors of pyrrolidine derivatives of interest, including homoisoazanucleosides [1,3,4].

The desired compounds will be prepared by reaction of 8-phenylmenthyl/8-phenylneomenthyl glyoxylate [5] with several amines [benzylamine, (*R*)- and (*S*)-phenylethylamine] and cyclopentadiene in the presence of a Lewis acid. After reduction of the cycloadducts obtained using LAH, introduction of the heterocyclic bases will be attempted using several methodologies:

- Mesylation followed by nucleophilic substitution with the activated base
- Nucleophilic substitution *via* PBr₃
- Introduction of the bases *via* Mitsunobu



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Oxidative coupling of methane over Ce-based mixed oxides

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One of the main advantages of the oxidative coupling of methane (OCM) is its ability to produce higher hydrocarbons (ethane and ethylene, C₂₊) directly from natural gas. For this reason, a great deal of effort has been devoted to enhance both methane conversion and C₂ hydrocarbon yield in the OCM reaction.

The most efficient catalysts for the OCM reaction have been found to possess electrophilic oxygen centers/defects (oxygen vacancies or hole O⁻-type centers), as these sites are thought to be responsible for methane activation [1]. Furthermore, the selectivity to C₂₊ was also found to vary according to the oxide band-gap: the higher the band gap, the more selective to C₂₊ in the OCM reaction. Unfortunately, conversion of methane to C₂₊ hydrocarbons with high selectivity is difficult to achieve because complete oxidation to CO₂ and H₂O often occurs. It is believed that methyl radicals that are formed at the surface of the catalyst enter the gas phase where they couple to form ethane and/or ethylene. In addition to coupling, the gas phase radicals may enter into chain reactions that result in the formation of CO and subsequently CO₂. Thus, one of the challenges in catalyst development is to produce a material so that secondary reactions of C₂₊ are inhibited while the activation of CH₄ still occurs [2].

Ce-based mixed oxides are synthesized by the solvothermal approach using the corresponding nitrates as precursors, and methanol as solvent. The as prepared materials are introduced on a quartz wool plug inside a continuous-flow reactor, used for the OCM experiments. Products are analyzed by gas chromatography and the results of the reaction runs are analyzed in terms of CH₄ conversion and C₂₊ selectivity and yield.

In this work we compare and discuss the effect of Ce-based mixed oxides on both the activity and selectivity to C₂₊ during the OCM reaction. These parameters are dependent on the experimental conditions such as reaction temperature and methane/oxygen ratio.

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Solvothermal preparation of Ce-based materials

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Ceria (CeO_2) is a rare-earth metal oxide extensively used in catalysis, namely in the automotive industry and the treatment of toxic exhaust gases [1]. This metal oxide has concentrated much attention due to its ability to be easily and reversibly reduced from CeO_2 to non-stoichiometric oxides (CeO_{2-x}) under redox conditions. Given that the preparation methods have a significant influence on the structure, size distribution and the morphology of the materials, it is important that they are both simple and reproducible. Among the different synthesis routes commonly used to prepare Ce-based materials, the solvothermal approach is one of the most promising methods given its ability to control the morphology and prepare micro or nanoparticles [2, 3].

Ce-based mixed oxides are synthesized by the solvothermal method using the corresponding nitrates as metal oxide precursors, and methanol as solvent for the synthesis. The solvothermal synthesis is carried out in a 160 mL 316-SS high-pressure autoclave. In a typical run, the precursor is mixed with the organic solvent and the autoclave is heated up to the desired temperature under autogenous pressure [4].

The as obtained nanostructured materials are thoroughly characterized using N_2 adsorption-desorption isotherms at -196°C , temperature programmed reduction (TPR) and differential scanning calorimetry (DSC) coupled with thermogravimetric analysis (TGA).

In this work, different metal oxides are added to Ce (M-Ce-O) during the solvothermal synthesis, and its effect over the materials properties is discussed.

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Nanoparticles for Sensors

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Sensors are devices that can provide information on the composition of the medium in which they operate. The sensitivity and selectivity of these devices can be improved substantially by modifying the sensing elements. Nanoparticles have recently been used for the preparation of electrochemical and optical sensors, which present a number of advantages, namely the increase in surface area. This may result in these modified materials becoming more sensitive and selective [1, 2].

The aim of this work is the synthesis and characterization of gold nanoparticles (AuNPs) stabilized in appropriate modifiers for further evaluation of their use in sensors. In order to carry out the synthesis, a methodology for preparing nanoparticles that involve the chemical reduction of gold salt in solution was used [3, 4]. We especially sought to assess the use of ionic liquids for the synthesis and as a stabilizing agent, and ascorbic acid as a reducing agent [4].

The characterization of the nanoparticles, already prepared, was carried out using spectroscopic techniques (UV-Vis), Transmission Electron Microscopy (TEM) and electrochemical techniques, such as voltammetry (CV). This characterization allows for the evaluation of nanoparticles size, and the evaluation of their catalytic properties, surface charge and interaction with surfaces.

Immobilization processes of particles at the surface of the electrode were used in order to effectuate electrochemical studies, so as to obtain information on the effect of the AuNPs in cargo which occurs at the electrolyte / electrode interface modified with AuNPs.

The results showed synthesized AuNPs exhibited irregular pentagonal symmetry and the size of these AuNPs was about 60 nm. The results confirm AuNPs exhibit superior activity for electrocatalytic reduction of H₂O₂.

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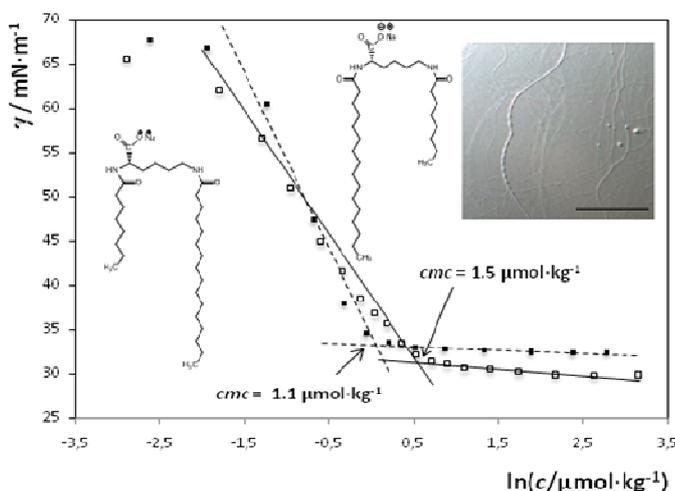
Self-assembly of anionic lysine-based surfactants with varying chain length asymmetry in water: from nanotubes to vesicles

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Amino acid-based surfactants, when possessing suitable functional properties, may arise as an excellent alternative to conventional surfactants owing to their enhanced biocompatibility and biodegradability and to the fact that they are based in natural renewable sources [1]. This opens up the possibility of a myriad of applications, namely in pharmacology, cosmetics, biomedicine and nanotemplating chemistry [2]. Furthermore, the common presence of a chiral centre in these type of amphiphiles may also give rise to peculiar self-assembly properties, since it dictates preferential molecular orientation, leading to chiral tubules, fibres, ribbons and other nano-assemblies [2].

In this work, we have synthesized a family of double-chained anionic surfactants derived from the amino acid L-lysine [3]. The compounds are designated here simply by C_mC_n , with both the total chain length ($m+n$) and the length of the two chains in the same molecule having been made different ($m \neq n$). The effect of the degree of asymmetry and structural isomerism of the compounds in their interfacial properties and self-assembly in water is explored (Fig. 1). The thermodynamic parameters of the phase transitions in solution have been determined by micro-DSC. Polarized light microscopy, dynamic light scattering and cryo-SEM have been further used to characterize the structural properties of the formed aggregates, with focus on tubules and spontaneously formed vesicles.



aqueous solution where tubular aggregates are seen displaying helicoidal structure, at room temperature (bar: 100 μm).

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Development of potent and selective MAO-B inhibitors: structure-activity relationship studies on chromone scaffold

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Parkinson disease (PD), is a neuroprogressive and incurable disorder with no real treatment, although some drugs are available to control the symptoms and/or slow down the progress of the disease. Levodopa (L-DOPA), a dopamine precursor, is the mainstay of the current therapy but it has tolerance problems and a wide range of adverse reactions, like involuntary movements and vomiting. The inadequacy of the current pharmacotherapy and the lack of drugs that can be effective in PD are the reasons why the discovery of novel chemical entities (NCE) is still a demand.

Monoamine oxidase (MAO) inhibitors, specifically of MAO-B type, are considered useful tools for the treatment of PD. When used in combination with levodopa, inhibitors of MAO-B may enhance the elevation of dopamine levels after levodopa treatment, particularly when used in early stages of the disease when dopamine production may not be so severely compromised. Furthermore, MAO-B inhibitors may also possess neuroprotective properties in part by reducing the damaging effect of dopamine turnover in the brain. The MAO-B inhibitor effects are especially relevant when considering that the brain shows an age-related increase in MAO-B activity.

Based on these observations one can take advantage in the management of PD throughout the design of novel MAO-B drugs since a selective inhibitor have not been found yet. In fact the rational design of new chemical entities is a niche in the large field of drug discovery and opens the possibility of the discovery of innovative drugs that may have enhanced therapeutic potential in the treatment of PD.

The main goal of the project is the rational discovery of new chemical entities (NCE), based on benzopyrane structure possessing potent and selective MAO-B activity as a novel and promising treatment approach for Parkinson disease.

The rational design and structure-activity-relationships data obtained so far will be presented in this communication.

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Thermotropic liquid crystals from double-chained lysine-based surfactants: synthesis and study of the effect of chain length mismatch

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The design and synthesis of surfactants based on amino acid residues as polar headgroups has important application-related goals, in view of the low toxicity, high biodegradability and high chemical stability of such amphiphiles. Consequently, this class of biofriendly surfactants has become a viable alternative to petrochemically based amphiphiles. Aside from their aggregation properties either in neat water, oil-water or polymer-water systems, surfactants often have a fairly interesting behavior, from a physical chemistry viewpoint, as one-component systems per se. Upon heating many amphiphiles do not directly melt from the crystalline phase to the isotropic liquid phase, forming instead one or more intermediate structures, known as mesophases or thermotropic liquid crystal [1]. These structures always possess long-range orientational order and variable extent of positional order of the molecules.

In this work, we investigate the thermal mesogenic behavior of a class of double-chained lysine-based surfactants with variable degree of chain length asymmetry. The compounds are designated by C_mC_n , and three series are available: (i) C_8C_n with $n=12, 14$ and 16 ; (ii) C_mC_8 with $m=12, 14$ and 16 ; (iii) $C_{12}C_{16}$ and $C_{16}C_{12}$. Thus, the effect of chain length difference, total chain length and structural isomerism on the mesogenic behavior can be studied, with the ultimate goal of obtaining structure-function relationships. The synthesis of the compounds comprises a condensation reaction between methyl N^ϵ -benzyloxycarbonyl-lysinate chloride with a fatty acid. The final salt is obtained upon alkaline hydrolysis of the ester [2]. The characterization of the thermal behavior (Fig. 1) is carried out by differential scanning calorimetry (DSC), for the determination of the phase transition parameters, and by polarizing light microscopy, for the identification of birefringent optical textures of the mesophases [3].

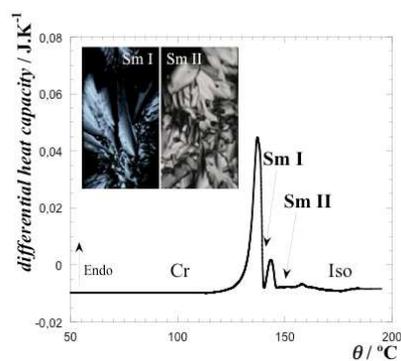


Fig. 1: DSC thermogram ($3.0 \text{ K} \cdot \text{min}^{-1}$) of the surfactant $C_{16}C_8$ and micrographs of the smectic liquid crystalline textures (Sm I and Sm II) obtained by polarizing light microscopy.

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Additives in electrodeposition of Zinc-Tin alloys

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Electrodeposition is a well established technique to modify surfaces and in the current work we show how DES formed with choline chloride can be used for the electrodeposition of zinc, tin and zinc-tin alloys [1]. The morphology and composition of the deposits growth are known to depend on the presence of additives in solution [2]. Electrodeposition of zinc-tin alloys is being revisited due to the possible used to replace the use Cd that may be soon phased out [3].

Following the studies carried out access the influence of HBD the alloys characteristics obtained from the deposits of zinc-tin for choline chloride + ethylene glycol (ethaline) mixture in the presence of additives.

Voltammetric I-E profile of zinc, tin and zinc-tin alloys deposit from ethaline in the presence additive HEDTA(N-(2-(Hydroxyethyl)ethylenediamine-N,N',N'-triacetic acid) are similar to those obtained in its absence, by contrast the presence of a derivative of HEDTA show significant alterations in I-E profile of tin and zinc-tin alloys (Fig. 1).

The difference may ascribed to the formation of a complex of tin with additive wich displaced its deposit potential forward more negative values.

The image will be presented comparing the morphology and composition of the deposit growth for solution with different additives.

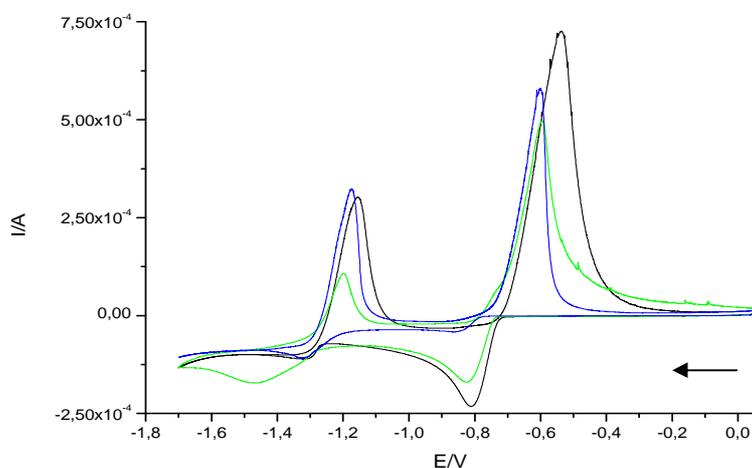


Figure 1 – Voltammograms for a GC microdisc electrode immersed in 1ChCl:2EG containing $2,7 \times 10^{-1} \text{ mol dm}^{-3}$ of ZnCl_2 , $5,7 \times 10^{-2} \text{ mol dm}^{-3}$ of SnCl_2 : without additive (black line), with $5,5 \times 10^{-2} \text{ mol dm}^{-3}$ of HEDTA (green line) and with $5,5 \times 10^{-2} \text{ mol dm}^{-3}$ of a derivate of HEDTA (blue line) at scan rate of 50 mV/s.

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Antioxidant Capacity of Commercial Drinks: comparison of beers, soft drinks, and wines

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Antioxidants (AO) are substances that block damages caused by radicals, thus preventing oxidation or inhibiting reactions promoted by oxygen, peroxides or other radical species. The intensity of this effect depends on the chemical structure and concentration of the AO present. In complex systems such as food samples, this effect is measured as a global Antioxidant Capacity (AC), indicating in general the quantity of a deactivated free radical on a test solution. Thus, the AC of a specific food suggests its degree of protection against radical oxidative damage, a chemical alteration that may turn out a physiological condition, when in oxidative stress, strongly correlated to degenerative diseases.

This work compares the ACs of several commercial drinks: 6 wines, 18 soft drinks, and 12 beers were determined and compared. Each sample was analysed by different AC assays, against different standards. The AC assays selected for this purpose were (i) Total radical trapping antioxidant parameter (TRAP); (ii) Trolox equivalent antioxidant capacity (TEAC); and (iii) Ferric ion reducing antioxidant parameter (FRAP) [1,2]. Ascorbic acid (AA), Gallic acid (GA) and Trolox (TR) were used as standards.

AC data was statistically analyzed with regard to method, standard, brand name, kind of drink and sample components such as gas, flavours, preservatives, AOs, and vitamins. ANOVA tests suggested, in general, significant statistical differences for methods and standards [3] of beers and soft-drinks. For beers, TEAC method displayed the lower ACs and Trolox standards the higher ones. The AC of soft-drinks varied with the method only when GA was used as standard. However, their acidity regulators, % of juice and colour affected the ACs. Regarding wines, none of observed variables played a statistically significant effect upon the AC.

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New Computational Methods to calculate Drug-receptor binding free energies

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Twenty eight years since its discovery, AIDS remains the biggest cause of early death among men and women between 15 and 59 years old, infecting presently over 33 millions people [1]. Stopping the virus responsible for this disease, HIV, is a worldwide goal.

Reverse Transcriptase (RT) plays a fundamental role in HIV life cycle and is an important target in anti-retroviral therapy. RT is a polymerase that converts the (+)-sense single stranded RNA viral genome into a double-stranded DNA copy that can be integrated into the host cell genome to enable expression of viral proteins and subsequent new virions[2].

Drug resistance critically contributes to the failure of the antiretroviral therapy, and it is associated to high viral turnover and mutation of HIV-1 and favoured by selective pressure exerted by antiretroviral drugs[3, 4].

In Computer-Aided Drug Design, chemists model lead compounds and calculate their drug-receptor binding properties, finding new or improved drugs. The potency of a drug is measured by its drug-target binding free energy, namely the affinity of an inhibitor with its biological target. Using Thermodynamic cycles will allow us to analyse the effects of changes in some compounds on Solvation Free Energy ($\Delta\Delta G_{\text{solv}}$), looking for a pattern that may help in the calculation of $\Delta\Delta G_{\text{binding}}$.

We intend to devise a new theoretical approach to calculate drug-target binding free energies by the elaboration of an improved method and the creation of an user-friendly software for the prediction of ΔG_{bind} .

Acknowledgments: FCT (SFRH/BD/46867/2008)

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Chemical and structural characterization of pectins in fruit juices

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During the last years fibre intake has been declining. Hence we have seen the introduction of new and innovative ingredients which offer functional capabilities that may help the prevention of a large number of diseases [1].

Pectin (Figure 1) is the most structurally complex family of polysaccharides in nature, acting in the human body as a dietary fibre, which promotes multiple positive effects on human health including lowering cholesterol and serum glucose levels, reducing the risk of several types of cancer and stimulating the immune response [2]. Therefore it is of most importance to develop simple and faster analytical methodologies that allow its determination and characterization in different food matrices.

The major aim of this work was the determination of the total content of sugars present in pectin from several matrices, in order to gather further structural and chemical information on this compound. This methodology consisted in the initial chemical and enzymatical hydrolysis of the pectin chain, followed by derivatization with aminobenzoic acid ethyl ester (ABEE) and determination by high-performance liquid chromatography with spectrophotometric detection (HPLC-UV).

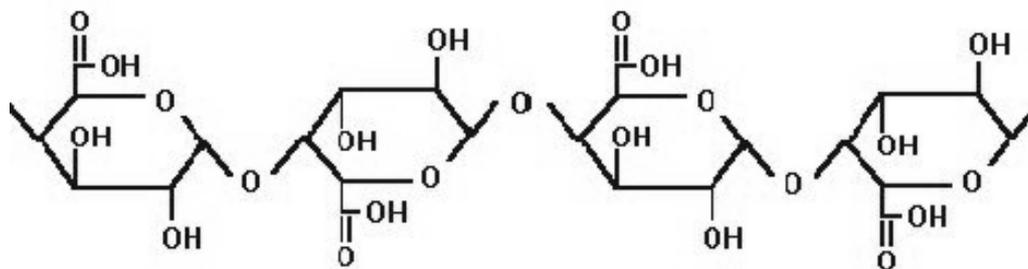


Figure 1 - Pectin (polygalacturonic acid)

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Potentiometric detector for ibuprofen determination

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Ibuprofen is a non-steroidal anti-inflammatory drug with analgesic and antipyretic properties. It has been extensively used in the treatment of many diseases like rheumatoid arthritis, degenerative joint disease, ankylosing spondylitis and acute gouty arthritis. Apart from a non-specific visual titrimetric method proposed by the British Pharmacopoeia[1] other procedures including high-performance liquid chromatography[2-4], thin-layer chromatography[5], capillary electrophoresis[6, 7], spectrophotometry[8], infrared spectrometry[9], conductometry[10], and potentiometry[11, 12] have been proposed. A simple and sensitive potentiometric procedure for ibuprofen determination is presented, after development of selective electrodes based on PVC membranes using cyclodextrin as ionophore. Several lipophilic ionic species were also used in order to optimize the characteristics of the membranes.

The evaluation of the general characteristics for the prepared units revealed an analytical linear range between $4,6 \times 10^{-4}$ and $1,0 \times 10^{-2}$ mol L⁻¹; slopes of about 63 mV/dec, and low response time. The evaluation of potentiometric selectivity coefficients notice that the electrode is very sensitive to ibuprofen when compared to chloride, bromide, fluoride and phosphate. The usefulness of this electrode will be evaluated using commercial pharmaceutical formulations.

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Literary Archetypes in Eduardo Galeano's *Mujeres*

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The literary universe is full of works that refer to myths. The compendium *Mujeres*, of Eduardo Galeano has the woman as thematic and it is compounded by micro short stories, narrative genre that promotes a maximum condensation of thematic and structural elements. These are literary reports in which the synthesis is prioritized simultaneously to the lyricism. In order to analyze the archetypal nature of myths about femininity, we studied specifically the short stories of *Mujeres* in which the myths of femininity are poetically reconstructed. Methodologically, we support ourselves on the mythcriticism and on the theory of the anthropological structures of the imaginary idealized by Gilbert Durand. Through these bases, we did the analysis of the narratives that are articulated in our corpus, in order to identify the several specific narrative devices that operate on it. Through the mythemes present in the narratives, we reveal the archetypal structures of the text and we inquire how they are literally built. Furthermore, we elucidate the archetypal representation content about the inherent femininity in the narratives and finally, we grouped the situations and the existing combinatorial in micronarratives set, drawing the possible existing connections. Thus, we did a study of analysis and mythcriticism itself.

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The Effects of Climate and Particle Concentration on the Respiratory and Circulatory Morbidity of Porto (2000-2007)

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Keywords: Climatic Elements; Synoptic Situation; PM10; Respiratory and Circulatory Diseases.

Several epidemiological studies have shown strong associations between the exposure to particle concentrations and morbidity due to cardiovascular and respiratory causes [1-2]. Others have focused their attention in understanding the influence of climatic variables on morbidity and mortality [4-5].

Regarding the importance of environmental variables studies to prevent public health risks, this study aims to evaluate the effects of climatic variables and air quality in the morbidity of the Porto's Greater Metropolitan Area (GAMP).

During the period [2000-2007], there were 64,969 hospitalizations associated to respiratory diseases and 78,696 relative to Circulatory diseases, occurring in four hospitals at the Porto's Greater Metropolitan Area. During the same period, several air quality monitoring stations in GAMP have shown a large number of days where particulates' concentrations (PM10) exceeded the limit value set by the Portuguese legislation.

Therefore, this papers' main goal is to investigate the relationship between the critical concentration of particles (PM10), with values higher than $50\text{Ug}/\text{m}^3$, the onset and/or the aggravation of these pathologies. On the other hand, it looks forward to understand the influence of the synoptic and climatological profile during the occurrence of a number of considered "critical" admissions.

On a first step, this paper will use multivariate analysis, namely Principal Component Analysis, in order to determine how some of the climatic elements (maximum and minimum temperature, total rainfall, average wind speed) and particles' concentration are related with the number of respiratory and circulatory hospitalizations.

Secondly, after identifying the type of relationship between variables, a Binary Correspondence Factor Analysis will be applied with the aim of combining quantitative and qualitative variables, and specifically defining the thermal breaks which characterize these days in which this "critical" number of hospitalizations occur.

Finally, this work will pay attention to differentiating the pollution and climatic context effects on the incidence of diseases according to populations' characteristics, namely age and gender, in an attempt to capture the main vulnerable groups.

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GIS and Detection of Areas with Archaeological Potential, the Iron Age in the NW of Portugal

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The use of Geographic Information Systems (GIS) as an aid for identifying areas with archaeological potential is used since the 80's in Canada and the United States by several departments of cultural management[1].

We analyzed the physical and topographical characteristics (independent variables) of 99 archaeological sites from the Iron Age (dependent variables) taken from a universe of 198 archaeological sites in order to know their characteristics. To analyze the studied area territory were also examined physical and topographical constraints of 120 sites that do not coincide with any archaeological site known (called non-sites).

It was used goodness-of-fit tests (Chi-square test and Mann-Whitney), between the 99 archaeological sites and 120 non-sites, to exam 14 physical and topographical variables in order to select which do not have statistical significance, thus were excluded 6 variables[2].

With the remaining 8 physical and topographical constraints it was produced a predictive model for locating potential archaeological sites of the Iron Age. For the development of the predictive model it was used, a statistic method called binary logistic regression[3]. This method, applied with GIS is able to produce a map of prediction of Iron Age archaeological areas with values ranging between 0 and 1(see Image 1).

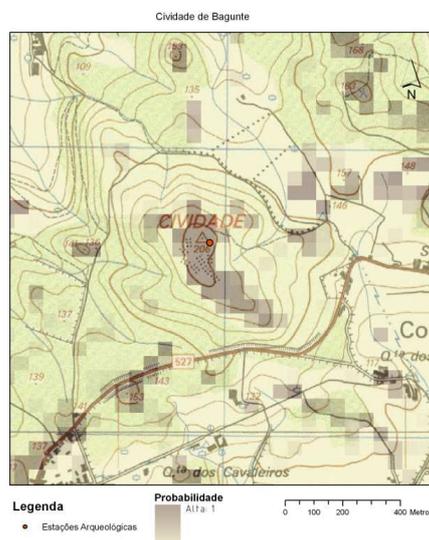


Image 1: Detection of an archaeological site

Defining the optimal value of detection it was created a map locating 97.5% of the archaeological sites of our studied universe and get an index gain of 0.95 (on a scale from -1 to 1)[4].

In this way the GIS is assumed as a good tool to assist the planning by helping the definition of potential archaeological areas.

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Bioclimatic Comfort – Implications to Human Health

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Extreme weather events are known to have serious consequences for human health and are predicted to increase in frequency as a result of climate change.

The idea of climate as a natural risk, rises a bigger conscience of the vulnerability of humankind towards climate [1].

Therefore, it became clear that the ability of humans to understand the behaviour and rhythm of weather in the place they live in and, facing it, to build shelters that maximise their potentialities and minimize their adverse effects, will allow benefits of thermal comfort and, in more extreme cases, avoid risky exposure to their health [2].

In this work we present a methodology of risk that involves vulnerability of dwellings and its inhabitants to extreme weather events, using as case study residential areas with different characteristics in the Oporto city.

To define the vulnerability of the buildings for the thermal comfort, characterization sheets' were prepared for each building, showing the *solar gains*, *humidity* and *ventilation levels*. Later, inquiries were made to demonstrate inhabitants' socioeconomic conditions and perception of thermal comfort [4]. The results were introduced on GIS (software ArcGis).

With these methodological procedures we obtained the different degrees of vulnerability of dwellings and its inhabitants to the extreme weather conditions.

Populations, subgroups, and systems that cannot or will not adapt are more vulnerable, as are those who are more susceptible to weather and climate changes [3].

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The Spatial Distribution and Travel Times of Firefighters in Oporto District

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Emergency services include police patrol, ambulances, fire protection and emergency repair for gas, electricity and water. In Portugal, the agents responsible for the protection and rescue services are the firefighters. The main objective of a protection and rescue service is to minimize the loss of life and material damages caused by any accident. To accomplish this goal, a set of performance measures must be taken into account, frequently four: cost, availability of fire companies, fire company work load and travel time. [1]

This paper presents an analysis and simulation of travel time in Oporto district, between each fire station and local of accident, considering the influence area for each station. We solve this exercise through a network analysis implemented in geographic information systems, considering the international norms of 8 minutes as the optimal travel time. [2],[3]

In general, we realize that the average travel time in this district is less than 8 minutes, being approximately 7 minutes. However, this reality is masked when we analyze the maximum travel time, only 8 of 45 fire stations can perform the service in 8 minutes. We assess which are the most problematic areas of the district in terms of service access, the ones that cannot be rescued in the optimal travel time, conditioning in this way the efficacy of this service and realized that this areas are: Amarante, Baião, Cête, Paços de Sousa e Póvoa de Varzim. The areas that have a better performance are the ones near the coast, except Póvoa de Varzim. Many of the fire stations are located so close to the boundaries of the performance areas that they leave vast areas of the territory with accessibility coverage quite larger than the optimal travel time.

To improve the efficiency of protection and rescue service offered by firefighters, it is necessary to build a new fire station and redistrict the areas of each fire station reflecting the territorial characteristics of each region.

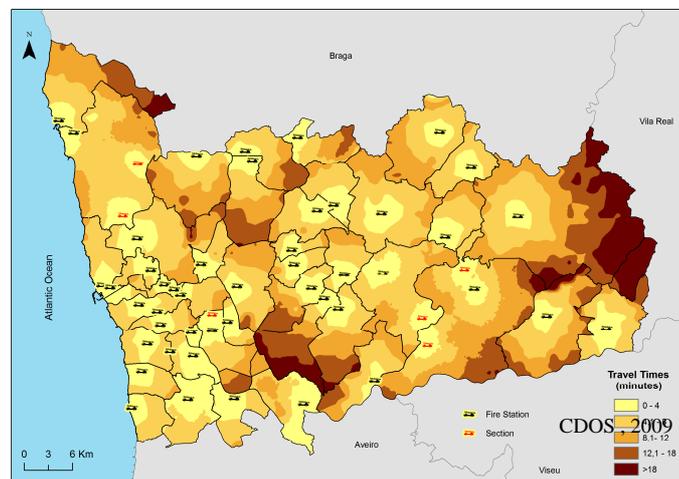


Figure 1 – Travel Time of Firefighters in Porto District

References:

- [1]. Sanli, I.; Al- Tamini, F. (1990), *The spatial distribution and resource allocation of fire safety service systems*, Architecture and Planning ,2, Riyadh, pp. 23- 42.
- [2] Sauvagnargues- Lesage (2001), *Implementation of GIS application for French firefighters in the Mediterranean area*, Computers, Environment and Urban System, 25, pp. 307-318.
- [3]. Liu, N.; Huang, B. (2006), *Optimal Sitting of Fire Stations Using GIS and ANT Algorithm* , Computer Operational Research, 5, 361-370.

“Does the distribution of public gardens and parks reflect the different socioeconomic contexts of Porto inhabitants?”

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Urban green areas' contribution towards sustainable urban development has been highlighted by a various number of international publications and organizations. This contribution derives from the benefices attributed to the presence of green areas in urbanized spaces: environmental, social and economic.

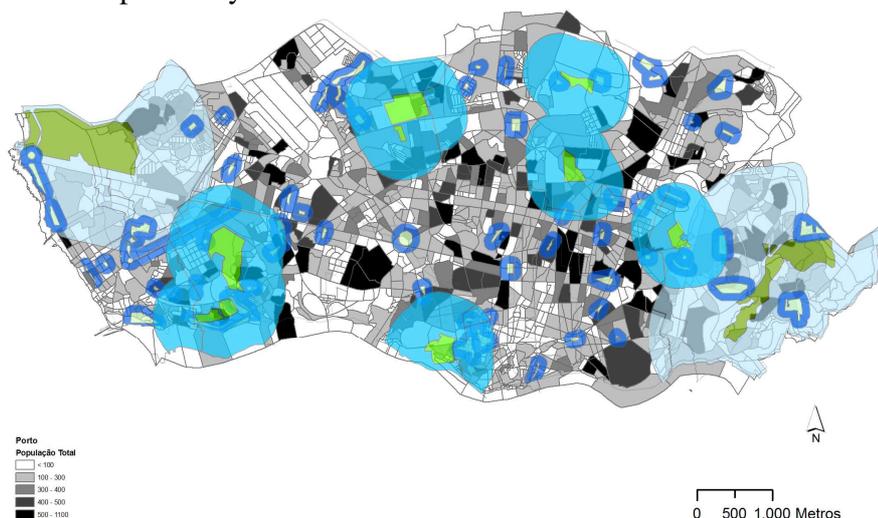
The main objective of this work, to analyze the Porto inhabitants accessibility to gardens and parks, according to their needs, and the different green areas attributes.

Using a GIS (ArcGis), the cartographic database with the gardens and parks representation (according to PDM of Porto) and, social, demographic, economic informations by borough provided by INE (Statistic National Institute) were joined in order to perform statistical and spatial analysis.

We classified public gardens and parks into three categories according to their area and attributes, determining in that way the influence area of each of the green spaces. Then, the different influence areas were crossed with social, demographics and economics variables.

Afterwards, we obtained several maps that gave us the relative area of influence of public gardens and parks of Porto (e.g. Picture. 1) associated with the main socioeconomic characteristics of people who live inside such areas.

We conclude that the boroughs, with high density of population, elderly population and citizens with low academic qualifications, have a few insufficient number of public gardens and parks in their proximity.



Picture 4- Influence area of gardens and parks of Porto.

Acknowledgements: Research developed in “Urban Environment” subject (undergraduate degree in Geography, FLUP) under the supervision of Prof. Helena Madureira.



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U. PORTO

Posters III Friday, February 19th

The potential of Austrian Architectural Experiments

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This work object of study is the Austrian architectural experimentation. Considering Wien as a city of cultural development, we analyzed their architectural production in order to speculate potentials to contemporary creative process and design practice.

In the first part we did a historical review to identify significant case studies and their respective main ideological concerns and debates. The methodology of this study first phase was based in bibliographic research and reading of the theoretical contribution from authors such as the Austrian architects Günter Feuerstein (1925), Friedrich Achlteiner (1930), the Italians Gianni Pettena (1940) and Franco Raggi (1945); as well as the visit to *Mind Expanders, Performative Bodies – Utopian Architectures around 1968*, exhibition at MUMOK (Wien) between 25th July 2008 till 30th August 2009, and in the studying of catalogues such as *Architecture Radicale*[1] and *The Austrian Phenomenon, Konzeptionen Experimente Wien Graz 1958-1973* [2], plus my own personal and professional experience in the Austrian context.

As stated in the outset, alongside the social and cultural revolution, following World War II, there was an artistic revolution in Wien. From the historical review we identified cases worth studying. The highlights were groups of architects, combining art architecture and performance, showed dissatisfaction with modernist ideas related to the machine, element of human body alienation. It is my opinion that such a context enables to be equated with today situation.

In the second part we proceeded with an analysis of the selected cases (protagonist, projects and performances). From a critical approach to the study, we organized the groups in two generations, designing a timeline to examine interferences and validate the importance of Austrian architectural development.

Even if the research is not finished, lot of outputs were already achieved, such has a series of graphical tables which highlighted, well known but also some not conceived till now, connections among generations, protagonists, projects and concepts of the Viennese architectural movement.

Thus, it can be considered that the *Austrian Phenomenon*, as ranks the British architect Peter Cook [3], occurred in the years 60's/70's. From this study we classify it as a moment of architectural language reformulation. We believe that our study contributes to a better visualization of the fluxes among the movements and contaminations in the global architectural redefinition.

[1] *Architecture Radicale* (2002), Catálogo da Exposição, Villeurbanne. p 357.

[2] *The Austrian Phenomenon, Konzeptionen Experimente Wien Graz 1958-1973*(2004), Hintergrund 23, Selene Editora, Architekturzentrum, Vienna.

[3] Cook, Peter (1970), 'The Austrian Phenomenon', in *The Austrian Phenomenon, Konzeptionen Experimente Wien Graz 1958-1973*(2004), Viena: Architekturzentrum, pp. 17-22.

Interdisciplinary Interests in our Architectural community: Visiting the space of the professionals and one decade of *Provas Finais* at FAUP (1999-2009)

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This paper presents a study on the multitude of subjects, fields and areas of interest brought into architecture during the last decade by its practitioners. [1]

With this study we intend to reflect on the use/contribution/validity/potential that this multitude of interests can bring to the contemporary architectural thought and design.

To achieve it, two different directions were taken.

The first one uses as work method reading and analyzing existing bibliography about this matter, in order to make a general approach to the topic outlining a series of concepts concerning this debate.

For this first part we begin by stating that architecture practice includes and absorbs a diversity of other disciplines. If we look at any publication devoted to Architecture, Internet sites or even events arranged by/for architects, we acknowledge how transversal and plentiful the gesture of the architect is. The same happens in the preparation of young architects, during their education. In this case, the variety goes from Project to Construction, from History to Theory, from Design to Urbanism, among many others.

The world we live in today, a stage for social and cultural mutations, is constantly changing and evolving. Architecture, as an intervenient agent in this reality, has to adapt itself for a perfect synchronization with the surroundings. Therefore, it suffers interferences, like a small piece of a puzzle that only achieves its full potentiality when in connection with other pieces. In this context professionals as well as students (as future professionals) of Architecture feel the need to reflect this cultural condition. By other hand, they also frequently feel the need to extend the borders and the *modus operandi* of the discipline.

The second part of the study is oriented into our geographical closest context. In this presentation we will mainly focus the universe of the finalist students (as future architects) using as *case-study* the universe of their work *Provas Finais* at FAUP in the period of 1999-2009. The collected information is arranged according to the main theme of each thesis, including a photo of the cover and the index; but moreover, we do an effort to provide a small description of the object, objectives, methodology and structure adopted in each item.

In the end of this survey, many results are expected. From mere graphics showing the diversity of topics chosen by each author to a reflection on the “interdisciplinary interests of the architectural community”, based on a systematic illustration of the multitude of their interests.

[1] This study is being carried out by Luis Lima in the context of his master dissertation, with the supervision of Professor Gonçalo Furtado.

Topology and Complex Geometries in current Portuguese Architectural Experimentation

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The ongoing investigation, which follows the completion of my MI.ARQ dissertation (supervised by Gonçalo Furtado), focuses on the potential of complex geometries and Topology within the Portuguese context of architectural experimentation.

(It is used here the term *complex geometries* (commonly associated with the set of non-Euclidean geometries, since these ensure the best representational method for complex shapes) as a way of reporting to the non-Euclidean universe. Within this non-Euclidean spectrum, Topology defines itself as a geometry of continuity, studying the invariant properties of objects under a homeomorphism i.e. transformation or deflection. As so, it exposes a fluid and continuous logic of the object's relations in space and time, which concerns the form and *genus* of the geometric figures.)

Initially, and by understanding the repercussion of the contemporary digital technology in its development, we shall reveal the potential of the complex geometries, in particular Topology, as the continuity line between the object's morphogenesis (as its by-product) and the architectonic materialization of concepts like the *Fold*. On a second phase, we analyse the relevance of such areas for the projectual experimentation and strengthening of the architectural education. Focusing on the national context, we attend to the history and specific characterization of these vectors, i.e., professional and academic.

Within the first, we study a small universe of protagonist practices and recent projects that have taken benefit from complex geometries. Above all, we analyze, from the applicative standpoint, its interest in experiments performed or performable in the national architectural context. Regarding the second, we conducted a comparative analysis of some public academy curricula.

It is worthwhile noticing the great majority of incidence in representational methods related to Euclidean geometry, undoubtedly of descriptive nature, thus, being the non-Euclidean plane somewhat missing from the most of the academic space. With regard to professional practice, the appropriation of modelling and animation software as a tool for formal generation is equally found weak, a fact somehow linked to a certain lack of interest in the exploration of soft and flexible geometries.

Additionally, will also be covered in the presentation the fact of being foreseen a certain debility within the national construction industry, in terms of the adoption of concepts and technologies necessary for the materialization of projects formally complex, such as the most commonly used mass customization, or even by the near absence of research and investment in new tools, techniques or materials.

Conceiving Geometry as the basic element to Architecture, by its need for representation and communication, and thus, inquiring about the potential of Topology as a conceptual generative system, the conclusion will center itself on the debate of the interdependence of those three vectors, questioning if we may be looking into a vicious circle advocated by them.

Modelling architectural components in composite materials for temporary shelter facilities

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This presentation relates to research conceived within the multidisciplinary project “modulation of architectural components in composite materials for temporary shelter facilities” [1] (fig.1). “The project includes major areas such as architecture, design and engineering. Its development requires a link with the areas of materials science and computing. The research project includes the installation of temporary shelters, as well as the modulation of several modules that make it up with composite materials, and their interaction with manufacturing methods supported computationally. The aim is to conduct a functional and aesthetic product, outlining possible strategies for its commercialization” [1]. The expected results are to have a prototype visible at the level of possible configurations, durable and aesthetically appealing.

As scheduled, to the present date were carried out the following activities: “Consolidation of the aims of the present investigation (...) the beginning of research publications, projects and authors in matters relevant competitors to the objectives to be achieved” [1]. It was proved necessary to perform a study of materials on topics of recycling, especially in households, systematized as: description / features / applicability. The properties considered were: mechanical (density, modulus of elasticity), economic (price), optical (transparency), thermal (thermal conductivity, melting temperature, flammability) and ecological (recycling, biodegradation). Due to this option, the planned “start of the architectural design of the facility and its modular components” [1] is postponed to the beginning of 2010.

The work is based on the idea that some materials for constructions can be achieved from reused wasted materials and inorganic materials abundant in nature, able for the construction of temporary shelters, through resourceful construction techniques. First there will be the dematerialization of the materials in basic constituents and then the recombination of them in new materials, with the desired properties for the manufacture of the components needed to the shelters. Second it will proceed to the modeling of components and their assembly in accordance with procedures optimized for various configurations and with applications of computational techniques.

The project is defined at the crossroads between the natural and artificial, between the domestic and industrial, with procedures in the digital and analog component modeling.



Fig. 1: Project concept

References:

[1] Furtado, G. et al (2009), *Projectos pluridisciplinares*. Universidade do Porto, pp. 4-5

Researching Rapid Prototyping in Architecture

L. Ferro¹, **P. Flores**², **F. Martins**³, **A. Chaves**⁴, **A. Carvalho**⁵, **L. Caló**⁵, **L. Moreira**⁵, and **G. Furtado (supervisor)**⁶

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This article is the sharing of research that has been held by the authors in the academic year 2009/2010, inside of the multidisciplinary actions LIDERA's program of Oporto University. This research continues the project LIDERA n°. 68 (Grupo UPR68-Unidade de Prototipagem Rápida), conducted in 2008-09. It is orientated to the areas of Design and Architecture and has two main objectives: to provide support to professionals and students in the specific problem of translating of its physical creative proposals, and to be a unit of research in the development of new technologies in Architecture.

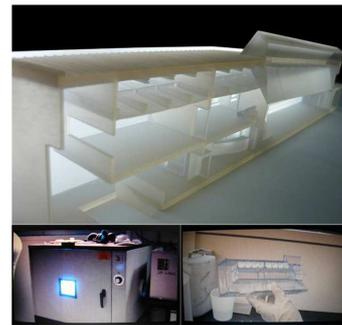
The study is divided into five main areas: a) Frameworks / current situation; b) Research and experimentation; c) Proposal; d) Financial incentives; e) Communication. The study of these areas was done in two different stages.

Initially, and in the point a), there was a survey of the academic affairs and business where it is common to use prototyping. A characterization of the market was also done. In the first phase and in the point b), we studied the several machining processes available, the software most in rapid prototyping as well as the human resources and training. Initially and in the point c), we made up the proposal in terms of software features chosen, the type of machines to use, technical needs and financial approach needed to implement the project. Already in a second phase and at the point b), we selected and experimented to our future RPU installation 3 different processes: a process of addition, i.e. stereolithography (SLA) (Fig. 1); a method of subtraction, i.e. horizontal milling machine; and also a cutting system, i.e. a laser machine. Also in the second phase and in the point, d) we studied possible lifting of grants, incentives and other hypothetical funding, and in the point e), we aimed to promote the study of UPR68 through the preparation of papers and possible marketing strategy to follow. "[1]

At the moment we are consolidating the areas studied before, and trying to expand the idea of an UPR facing the field of trade and research. On one hand we want to strengthen the basis of work done last year (a historical investigation about the appearance of the various RP processes; expanding and deepening the surveys of academic and professionals affairs at the international level; looking for more incentives and available financing for creating the hypothetical UPR), on the other hand we intend to understand the implications of the rapid prototyping may face in areas such as design and architecture in the compilation of either 1:1 scale models, the study of new materials (study of relationships between RP, composites, and bio-materials) and construction, through the study of innovative building processes.

References:

[1] Grupo N° 68, Pré-Proposta de continuidade do projecto Lidera, UP, Porto, September 2009.



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Vernacular Typography in Porto - A case study research about the drawing of lettering from the Garrafeira O Ananás' posters.

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This paper seeks to develop a theoretical and practical study of letterings drawn in sales promotion posters and used in point of sale of small companies in the city of Porto. Specifically, the case study research of the letterings used by the Garrafeira O Ananás, located in the neighborhood of Paranhos.

The theoretical stage of this research is essentially based on the concepts of Dones [1], Rahde and Cauduro [2] who shows a direct link between postmodernism and the vernacular production. During the empirical research, data were collected, registered in a field diary and then analyzed. Later, the practical step of this research was to systematize the material collected to understand the features of the design of the letters and thus enable the digitization of the alphabet produced by the merchant Jorge Manuel Lopes Cardoso.

Finally, taking the digitized alphabet as a starting point, was generated the Seu Jorge typeface. That font received nonexistent characters in the original handmade design and adjustments in order to not only registered the vernacular production of the Porto City as well as contribute to the expansion of the sparse literature produced in Portugal on the subject.

References:

[1] Dones, V. L. (2004), *As Apropriação do Vernacular pela Comunicação Gráfica*, 7th Brazilian Conference of Folkcommunication, Rio Grande do Sul, May13 – May16, 2004, pp.1-12.

[2] Rahde, M. B. F. and Cauduro, F. V. (2005), *Algumas Características das Imagens Contemporâneas*, **Fronteiras – Estudos Midiáticos, Rio Grande do Sul, vol.VII, n.3, pp.195-205.**

Recycled Spaces

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Faculty of Fine Arts, University of Porto, Portugal.

The architecture background and the understanding of the social sciences made me analyze and perform in public space, often trying to understanding it on an individual perspective. [1]

Once, there was a town called Jelgava, in Latvia, a particular territory that sent me somewhere in my thoughts. An introspective space by the river, that was a rubbish deposit and, at the same time, used by homeless people.

Suddenly the idea of collect and organize trash began.

In a spontaneous way, and with up to 20 helping hands, a metaphor of a shelter was created. It took 30 minutes to build it with only materials found in the surroundings. (Fig.1)



Fig.1 **Māja in 30'** - Jelgava, Latvia.

Leaving Jelgava, Māja - which means home in Latvian - stands as a testimony of an outsider's reflection, but to me, it marks a beginning age of research in attempt to develop a sequence of thoughts and actions to perform urban recycling.

The idea is to apply the same critic performance in different places, adapting each place to its implicit needs, featuring the local resources, improving occupation capacities and leaving marks of my inner thoughts. [2]

[1] Mela, Alfredo (1999), *A Sociologia das Cidades*, Editorial Estampa, Lisboa.

[2] Silvano, Filomena (2001), *Antropologia do Espaço*, Celta, Oeiras.

"Pause", Urban Intervention, artistic and political act

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Using the street as an artistic medium, constantly putting the city in a creative process, makes all the spaces can be used in a critical or poetic. More than spatial landmarks, the urban intervention provides crop marks, places and re-emphasizes landscapes. Intervene in the daily through art raises questions about the paradigms of contemporary art and its relationship to social reality. The point here is then the artistic act itself, the performance of the body, the ritual before the scenic viewers [1]. In this sense this work is a theoretical reflection of urban intervention 'Pause' and the various issues it raises. His formulation was initiated in the discipline Painting IV Course Technology Arts of former Federal Technology Center of Ceará (CEFET-EC), current Federal Institute of Education, Science and Technology of Ceará (IFCE). Part of the project was supported by the Centro Cultural Banco do Nordeste in Brazil (CCBNB), the project entitled Long Distance. Thus, for three months, the project 'Pause' happened in several areas of the city of Fortaleza. This intervention, when juxtaposed to the salad that flood of information throughout the life of the city, can interfere with quick glances, tired, distracted, rushed, modern, creating perhaps a thought, an astonishment, a pause out of the ordinary time of the city.

References:

[1] DUBOIS, Philippe (1993). *O ato fotográfico*. Campinas-SP: Papirus.

The use of photography in the educational process

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Since the image can educate? As the production and image analysis cameras can influence the adolescents' view on themselves, about their community and about your city? With these questions that this thesis is outlined. Nowadays, images, among them the cameras, mediated by the industry cultural, often have occupied roles of "teachers" of society as a whole. This "education", especially directed at young people from all walks of life, presents consumerist clear objectives and has strong power to create and recreate cultural values to achieve their goals. Such "Education" is widespread in all environments for the exchange of human knowledge (family, school), however, most sometimes unconsciously and uncritically, processing and dialectic.

For Lévy (1999) the second flood will never end. "There is no solid background in the ocean of information. We accept him as our new condition. We must teach our children to swim, float, maybe surfing "(Levy, 1999, 15) [1]. In this flood of information, images have pride of place. The increasing proliferation and integration of electronic media have been giving on to think that we are under the aegis of the "era of image." In The war of Dreams, Marc Augé (1998) [2] goes further and examines the consequences of this so-called "era of image." The invasion of the images in the daily lives of people put in their own reality check. The fiction becomes reality.

This paper discusses these issues through the empirical field determined in experimental production workshops and critique of photographic images with people from the periphery that attend the social project Grow with Art (Foundation for the Children Family and Citizenship). The search is one of the hypotheses of that the exercise of producing images of himself and the reality that surround gives students the practice of his powers creative in order to act not merely as observers and receptors, but as actors of their own lives, thus enabling the viability of another tool teaching.

References:

[1] LÉVY, Pierre (1999), *Cibercultura*. São Paulo: Ed.34.

[2] AUGÉ, Marc (1994). *Não-lugares: Introdução a uma antropologia da supermodernidade*. Campinas-SP: Papyrus.

Alvarinho – A proposal for a mascot for the Environmental Education Quercus

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This work is part of the master's thesis submitted to the Faculty of Fine Arts, University of Porto and the research was developed in order to use the design so committed to the society and environment in relation to education and recreational environmental education. It is known that can and should make use of play activities with a view to obtain significant results for the development and training of individuals, the playful one royal road to the unconscious child, thus confirming the importance of working this process awareness and environmental education since childhood, for that we conceived the creation of a playful element that would facilitate such communication.

We administered a questionnaire with 64 children attending a school environmental education supported by Quercus (Portuguese Non Governmental Organization Environment), aged between 07 and 11 years to understand the preferences of the public related to the physical qualities of personality and attitude a protector of the environment should have. Also participated in a brainstorm for the suggestion of a name for the mascot. After the result, we defined the concept of the mascot being developed that part of the object's logo consists of an oak leaf and an oak acorn, stylized green (Fig. 1). The responses collected with the questionnaire also helped to build the profile of the character.

With this research was possible to confirm that design can contribute to the awareness of children about the environment. The development of an element of communication with playful component to communicate environmental issues of this work, the mascot of an environmental institution, presented himself as very attractive for children, but it needs to have the applications they develop in other products alone, do not fulfill the goal of educating and raising awareness. It is necessary to apply the mascot in action as puppets, books, booklets, games, toys, comics, pin and others.



Fig. 1

References:

- [1] ANCHIETA, Brunna. *Educação ambiental através do lúdico para o público infantil*. 2009. Dissertação (Mestrado em Arte e Design para o Espaço Público) – FBAUP – Porto, Portugal.
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- [4] HUIZINGA, Johan. *Homo Ludens: um estudo sobre o elemento lúdico da cultura*. Lisboa: Edições 70, 2003.

Hydraulic characterisation of nonwoven geotextiles

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Geosynthetics are polymeric materials widely applied in Civil Engineering structures (such as, waste landfills, roads, railways, tunnels or ponds) due to economical, technical and environmental advantages. The geosynthetics are a good option for the construction of many structures, in substitution of some traditional materials. The geotextiles are the most applied geosynthetics, as they can perform many different functions (separation, filtration, drainage, protection and reinforcement).

For performing appropriately a function, the geosynthetics must have suitable physical, mechanical and hydraulic properties. Moreover, they must present a good resistance against many degradation agents (a premature failure of these materials can compromise the stability and/or the functionality of the structure where they are inserted).

In this work, it was characterized the water permeability behaviour (normal to the plane) of several nonwoven geotextiles (damaged and undamaged specimens). The hydraulic tests (EN ISO 11058 [1]) were carried out in an equipment (a prototype) developed at the Laboratory of Geosynthetics (LGS) of the Faculty of Engineering of the University of Porto (Fig. 1).



Fig. 1 – Equipment (a prototype) developed at the LGS for the determination of the water permeability (in plane and normal to the plane) of the geosynthetics.

Acknowledgements: FCT (Fundação para a Ciência e a Tecnologia – Portugal) (Research project PTDC/ECM/67547/2006).

[1] EN ISO 11058 (1999) *Geotextiles and geotextile-related products – Determination of water characteristics normal to the plane, without load.*

Drug-Design of Catechol-O-methyltransferase Inhibitors for Treatment of Parkinson's Disease

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Parkinson's disease (PD) is characterized by degeneration of neurons in the central nervous system (CNS) that synthesize dopamine, a neurotransmitter that intervenes in the coordination of the motor activity.[1] In order to overcome the effects of the low concentration of this substance, the patient can be treated with levodopa, the natural precursor of dopamine.[2] However, the enzyme catechol-O-methyltransferase (COMT) is able to metabolize levodopa, making

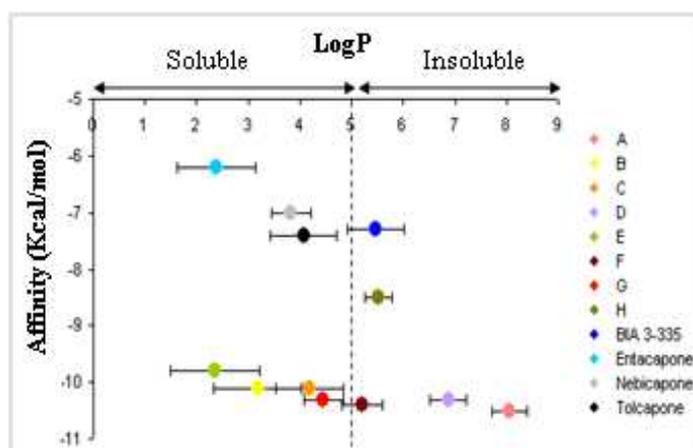


Figure 1 – Drug affinity to COMT versus solubility

essential the administration of a COMT inhibitor to the patient.[1, 3] Inhibition of COMT leads to increased peripheral bioavailability of levodopa by reducing its catabolism, and also prolonging the action of dopamine in the brain and increasing the effectiveness of levodopa in the CNS.[3] This study aims to design a new generation of COMT inhibitors, using molecular modeling methodologies, in particular docking methods. A new library of high affinity COMT inhibitors was designed based on the nitrocatechol group. The drug-COMT structural complexes and binding affinities were evaluated with Autodock VINA.[4] The logP of compounds was also determined using ACDLABS 12.0. We have found 4 new ligands (Figure 1) with high COMT binding affinity and logP<5 (drugs B, C, E and G). The drug E, designed by the authors, has increased potency over drugs already sold or in developed, including Entacapone.

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[3] Dingemans, J., Catechol-O-methyltransferase inhibitors: Clinical potential in the treatment of Parkinson's disease. *Drug Development Research*, 1997. 42(1): p. 1-25.

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Incorporation of nanocomposites materials in coverings for development of intumescent paints

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A paint is a pigmented product (liquid, paste or powder) that when applied in a particular material forms a film with decorative, protective or other properties, [1]. The intumescent paints have a specific property: when in contact with high temperatures (above 200 °C) they form a carbonaceous foam with a density expansion of about forty times, which protects the substrate from heat.

The main objective of this work is the development of intumescent paints reinforced with nanosilica in order to increase their heat resistance, improving the mechanical strength and the thickness of the intumescent foam.

The first step to make intumescent paints is the preparation of the nanosilica dispersion in water, which is subject to some tests to characterize its quality. Then this dispersion is mixed with a polymeric emulsion, which constitutes the binder for the paint. Afterward, this emulsion is combined with the solid components (pigment and reactive additives that will cause the development of the intumescence above a certain temperature). The final paint is then characterized to verify the quality of the formed carbonaceous foam after heat exposure.

In conclusion, combining the properties of nanosilica particles with the polymeric emulsion, the homogeneity and mechanical strength of the carbonaceous foam increase. Therefore, it is possible to delay the raise of temperature in the protected material.

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Incorporation of a nanostructured material into textile substrates for development of high insulation materials

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Thermal insulation is a key issue in many different applications namely: clothing, construction, sports, aerospace and automotive. There are two ways of obtaining improved thermal insulation [1, 2]:

- Increasing the thickness of the insulation, a method which has been used for the last 20 years but which has various disadvantages, for example the loss of space, the increase of weight, etc.
- Reducing the thermal conductivity of the insulation material.

The aim of this work consists in the incorporation of a nanostructured silica based material into different thin and lightweight textile substrates, to improve their original thermal insulation properties. Different incorporation procedures were studied and the developed materials were characterized by Scanning Electron Microscopy with X-ray Microanalysis (SEM/EDS), Fourier Transform Infrared Spectroscopy with Attenuated Total Reflectance (FTIR/ATR) and thermogravimetry (TG). The thermal resistance was measured by Sweating Guarded-Hotplate method (commonly named Skin Model) in accordance with the standard ISO 11092:1993 [3,4].

The results showed an expressive increase of the thermal insulation properties of the treated textile substrates.

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Structural evaluation and characterization of materials used in custom-made medical devices (socket of lower limb external prosthesis)

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The transfemoral prosthesis is used to restore the appearance and mobility of patients who suffered a lower limb amputation above the knee. The fitting of a transfemoral prosthesis consists of a matrix resin and reinforcement fibers and, sometimes, it is made from thermoplastic. They present a critical role in the successful application of the prosthesis, since it is there that transfers of forces from the body to the prosthesis occur. This work aimed at studying the manufacturing' method and characterize the materials used by the Center Reabilitação Profissional de Gaia (CRPG), since some cases of failure of the device have been reported, mainly due to fractures of the dock, but also due to irritations and allergies to the material.

Techniques of topographic evaluation and analysis of the compounds on the surface of the plug in contact with the skin have been applied (2D radiograph, SEM and FT-IR ATR) and mechanical tests for characterization of materials (tensile strength, cut interlaminar roughness and 3D scanning). The irregularities of the inner surface of the dock due to the method of construction can be easily overcome through the use of sandpaper with smaller size and less vigorous mixing of resins. The quantification of mechanical properties was compromised by the non validation of the tensile tests and interlaminar court. However, from these tests it was possible to draw some conclusions on the Young's modulus of the laminate (0.65 GPa to 1.18GPa) and thermoplastic (0.20GPa the 0.63GPa). With regard to biocompatibility, it is noted that the healing process of the resin has an important role in stabilizing the monomers methyl methacrylate, avoiding reactions with the skin. From the results, it appears that it is necessary to rethink the process of manufacture of plug-ins so that you can improve your performance and provide comfort to patients.

Development of a microbial fuel cell for clean energy production

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Future economic growth crucially depends on the long-term availability of energy from sources that are affordable, accessible and environmentally friendly. Microbial fuel cells (MFCs) provide new opportunities for the sustainable production of energy from biodegradable substrates. They can use natural wastewaters produced by the human being, which contain substrates and microorganisms, and turn them into electricity via adequate metabolic pathways. MFCs are devices that directly convert chemical energy to electricity through catalytic activities of microorganisms. One of the greatest advantages of MFCs comparatively to competing hydrogen and methanol fuel cells is that diverse organic compounds can be used as substrates [1, 2].

The aim of this work was the development of a MFC for the concomitant electricity production and wastewater treatment. The MFC consists of two separate chambers which were inoculated with microorganisms from a wastewater plant. These chambers, a 500 mL anodic section (operating under anaerobic conditions) and a 500 mL cathodic section (operating under aerobic conditions), are separated by a cation-specific membrane (Nafion[®] 112). The microorganisms adhered on the carbon brusher at the anode, oxidized the substrate and the resulting electrons and protons were transferred to a platinum-coated (10 mg Pt/cm²) carbon cloth colonized by microorganisms at the cathode through an external circuit (electrons) and the membrane (protons). Electrons and protons were consumed in the cathode, reducing oxygen.

The results obtained with the MFC operating continuously with a hydraulic retention time of 112 h demonstrated the potential of this bio-reactor system to produce electricity and to treat a domestic wastewater. Maximum power density of 3 ± 1 mW/m² (fixed 10000 Ω resistor) and chemical oxygen demand removal higher than 90 % were obtained. These results clearly demonstrate the potential of the developed MFC to treat domestic wastewater and to effectively produce energy comparatively to other MFCs [2, 3]. Further research will be developed in order to clarify the role of environmental process conditions in the MFC performance.

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Development of a *biomimetic* coating with reversible wet and dry adhesion properties

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In the process of natural evolution several adhesion systems have appeared among different animals, allowing them to become optimized for their natural habitat. The different adhesion systems of these animals can be permanent (e.g. clams, algae) or reversible (e.g. geckos, snails and flies) [1]. Biomimetic research is an approach that seeks to identify and replicate adaptive biological attributes with potential technological applications [2].

In this work, three different coatings, mimicking natural adhesives with reversible wet and dry adhesion properties were developed and applied in different polyurethane based substrates, in order to improve their wet and dry grip conditions.

For this purpose, two different approaches were tried: the preparation and coating of the substrates with a commercial formulation and the synthesis of two different polymers and subsequent coating of the substrates. In the first approach it was prepared a commercial formulation with dry adhesive properties. In order to achieve the second approach two different polymers were prepared. An acrylic copolymer rich in hydroxyl groups was synthesized by solution polymerization, and the substrates coated with it. An *in-situ* polymerization of another polymer with hydroxyl groups was carried out on the substrates. Polymers were characterized by FTIR (Fourier Transform Spectroscopy), DSC (Differential Scanning Calorimetry) and NMR (Nuclear Magnetic Resonance) and the wet and dry grip of the correspondent coatings were evaluated with a Frictiometer® FR700. The results were compared with the control samples.

The results indicate that all the coatings developed improve the wet and dry grip of the studied substrates.

Acknowledgments: This work was partially funded by Projecto de Investigação Científica na Pré-Graduação 2009, U.P. and Santander Totta.

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Micro-Cooling units using Magnetocaloric materials: MICRO-MAG-COOL

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The number of components in integrated circuits (IC) has reached such scale that the resulting high heat generation degrades their performance and reliability. In fact, because electric current densities in IC have steadily increased for decades, micro/nano-scale thermodynamics have become a major research subject. For this reason, the use of Micro Electro Mechanical Systems (MEMS), namely integrated solid-state micro-coolers, is becoming essential. The thermo-electric refrigerators are the most studied cooling system with envisaged technological applications on micro- and opto-electronic devices. However, alternative processes have recently emerged, from which magnetic refrigeration (Mag-Cool) is one of the most attractive [1-2]. These thermal machines are based on the magneto-caloric effect, in which reversible temperature gradients result from magnetization/demagnetization processes of magnetic materials. Unlike conventional refrigerators, magnetic refrigeration is a clean technology, i.e. completely chlorofluorocarbon-free, and its cooling efficiency can reach more than 50%, above that of thermo-electric and compression-cycle technologies.

We developed a system able to achieve compact localized cooling constituted by a magneto-caloric material (Fig. 1) incorporated in a rotatory fan. The magnetic material rotates between regions of applied and zero magnetic field, resulting in the intended temperature gradient. A flowing fluid is used as a heat exchanger. We simulated this system using Navier-Stokes (for the fluid movement) and heat transfer equations using a finite elements method. We considered there nanocrystalline magnetic materials on our simulations: $Gd_5Si_2Ge_2$, $La(Fe_{0.88}Si_{0.12})_{13}$ and $La_{0.66}Sr_{0.33}MnO_2$ [3]. These materials were chosen for their giant magneto-caloric effect near room temperature. Different refrigeration parameters were considered, namely device geometry, heat-exchange fluid, cycle-working frequency and frontier conditions. Finally, we were able to infer an optimal design, aiming magneto-refrigeration efficiency enhancement.

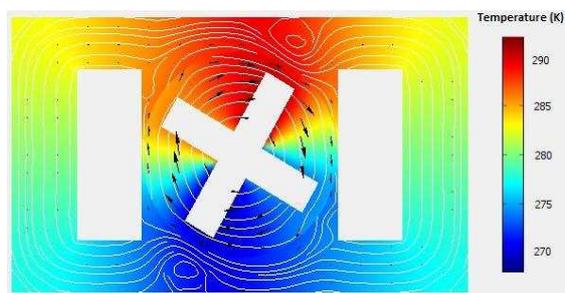


Fig 1 - Scheme of a rotary magnetic material

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VORSat – Measuring a CubeSat Attitude from the Ground

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VORSat is an ongoing project of the University of Porto regarding the development of a CubeSat. This project appears from an invitation by the Education Office of ESA (European Space Agency), after a long time collaboration from both parts on a project regarding stratospheric balloons called Straplex. It is also part of the QB50 experiment with ESA, Von Karman Institute of Fluid Dynamics and NASA.

The purpose of this project is to prove the feasibility of measuring the satellite attitude from the ground based on a set of RF signals transmitted from orbit. The idea is to combine multiple signals and antennas in such a way that certain modulated information depends on the direction from which the signals are received. Such information is coded in the form of signal phases, allowing computing the satellite attitude with one degree of expected accuracy. (A similar approach is used in the VOR - VHF Omnidirectional Range - navigation aid used in aviation, thus the name VORSat.)

The satellite will be travelling along its orbit and transmitting signals in all directions. Knowing the position of the satellite relative to a ground station, by measuring the phase differences of signals transmitted by different antennas on the faces of the satellite and their evolution as the satellite passes by the ground station coverage area, it is possible to compute the satellite attitude from the ground. Three orthogonal rings of antennas are necessary for this purpose, which implies to having 3 individual antennas per face. Other antennas are also required, for GPS (which must be omnidirectional) and for a simple localization beacon.

The transmitted signals are planned for the 2.4 GHz ISM band, using a bandwidth of just 15 KHz. The satellite will be completely solid-state, as the direction dependent signals will be obtained through beam-forming techniques, through a combination of the several antennas. The ground-station requirements are particularly simple: a 2 DOF parabolic dish with a 2.4 GHz feed and LNA, a tunable down-converter to base-band, a sound card and a computer running software to demodulate the signals.

As a secondary goal of the mission, VORSat will attempt to safely re-enter the atmosphere and have its kernel with stored information recovered (trajectory and internal sensor measurements). Re-entry is divided into three sub steps: adjusting friction in the higher atmosphere to adjust expected area of impact (with a goal to land in the Atlantic Ocean), surviving re-entry during the deceleration phase and recovery from the water. In order to guarantee a safe re-entry, the material used to cover the kernel is being analyzed, in order to assure resistance to high temperatures and thermal shock.

Another challenge is to combine antennas with the solar panels, so as to maximize the solar exposure area and energy provided. This development, along with the test of the attitude system in an anechoic chamber and the stability of the re-entry kernel, are being held for the last months.

Automatic Shooting Sport Target Classification System

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Digital photography technology evolution enabled continuous decrease of price per megapixel. So it became possible to use a common digital camera in systems that require precision image processing, such as classifying official shooting sports targets. This project has been developed as a low cost solution, for shooting sport target classification, and as an option to the use of specific classifying machines that are actually used. The project was primarily focused on developing software that automatically classifies the targets.

The photos used, to test the developed software, were taken in the laboratory, where a tripod was used to hold the camera down and align it with the target. After configuring some important parameters, like contrast and diaphragm aperture, the most important is to know the minimum size in pixels needed to process the image because as the file size gets bigger the more time the software takes to process.

The developed software can be divided into three parts:

- i) Detection and calculation of the centers of the shots.
- ii) Detection of the type of target and its center.
- iii) Shot classification.

To detect shots on the targets, the photos were taken with a red sheet beyond them. This color was chosen to detect the shots with a segmentation of the initial image. So the shots would be red in the image.

Processing this image we get the edges of each shot. The centers are calculated using an equation for centers of mass and then optimized by a least squares method.

Detecting the type of target and its center was based on images processed through the initial photo and in an algorithm that detects the size of target's black circle. Knowing that each target has different width for its black circle, the center and the type of target are automatically known.

Finally, through distance between points in a plane, and knowing that the radius of all shots is the same, we get the distance between the center of the target and the closest point of the shot to the center of the target, and, with that, the classification for each shot is made.

Graphic user interfaces, which gives an overview of the parameters used, and show the obtained results, has been developed so the software can easily be used.

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Assessing viscous fingering effects by measuring axial dispersion coefficients for different tracer viscosities

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Viscous fingering is a flow instability phenomenon that results in the destabilization of the interface between two fluids of differing viscosities. This flow instability is very common on chromatographic separators and reactors. [1] For example, in the synthesis of ethyl lactate, the viscosities of lactic acid (reactant) and water (by-product) are sufficiently different and that instability at the interface between these two solvents can be established and viscous fingering results. This phenomena is very complex to describe, but can be easily simulated by using an apparent axial dispersion coefficient that accounts that effect. Fluid dispersion in packed beds is a consequence of the effects of molecular diffusion and convection in the empty spaces. The dispersion might occur in axial and radial directions; however, in this work the radial dispersion was assumed to be negligible. [2]

The main objective of this work was to experimentally measure the apparent axial dispersion coefficient in fluid flow through a fixed bed column packed with Amberlyst 15-wet (ion exchange resin) in presence of viscous fingering. The axial dispersion coefficient was estimated by pulse experiments of tracer using different blue dextran solutions (blue dextran in water and blue dextran in lactic acid aqueous solution). The blue dextran is a polymer whose molecule is large enough (M.W. = 2,000,000) to diffuse only in the bulk fluid phase between resin particles. Samples of the blue dextran solution (0.2 cm³) were injected under different flow rates at two different temperatures, 20°C and 50°C, and the column response was monitored using a UV-VIS detector. In all the experiments the column was initially saturated with water. Water and lactic acid viscosities are of 1.02 cP and 53.5 cP at 20 °C; and 0.56 cP and 14 cP at 50 °C, respectively. The axial dispersion coefficient was determined through the Peclet number that was obtained by calculating the second moment of the experimental curves, at each operating condition. In Figure 1, it is shown the effect of the temperature, fluid flow rate and tracer viscosity on the axial dispersion coefficient. As expected, the axial dispersion coefficient increases with increasing flow rate. For blue dextran in lactic acid, viscous fingering occurs, leading to higher axial dispersion coefficients than those using blue dextran in water. Viscous fingering effect is attenuated by increasing temperature, once the difference in viscosities of water and lactic acid is lower; therefore, the apparent axial dispersion coefficient decreases.

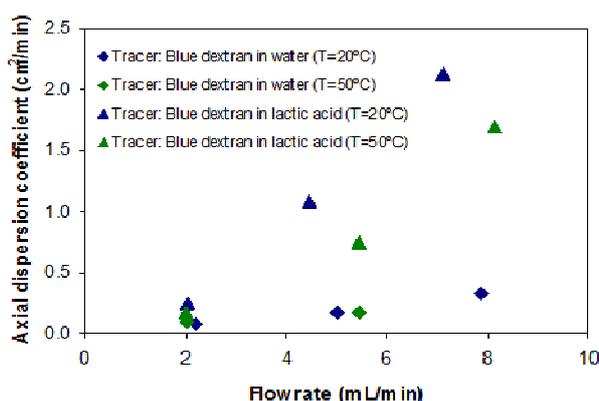


Fig. 1- Effect of fluid flow rate, temperature and tracer composition on the axial dispersion coefficient.

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New conductive polymeric materials for sensing surfaces

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It is well established that metals conduct electricity well and organic compounds are insulating. However, conductive polymers are organic compounds combining both of these properties. New conducting materials are now being prepared offering better electrical and physical properties and lower costs, and opening new perspective over the fabrication of organic solar cells, biosensors, flexible transparent displays, etc. [1-2].

Well-studied classes of organic conductive polymers include poly(acetylene)s, poly(pyrrole)s, poly(thiophene)s, polyanilines, polythiophenes, poly(p-phenylene sulfide), and poly(p-phenylene vinylene)s. Other less well studied conductive polymers include polyindole, polypyrene, polycarbazole, polyazulene, polyazepine, poly(fluorene)s, and polynaphthalene [1-2]. Better physical features may be achieved by copolymerization and doping with specific compounds.

The present work describes the preparation and analysis of a copolymer of thiophene doped with zinc chloride and methylmethacrylate, obtained by radical polymerization. Monomer and zinc chloride concentrations were optimized in order to enhance the polymer conductivity. In general, the synthesized polymers showed variable mechanical properties, depending on the chemical composition used. The best polymer presented about 0.2 M Ω resistivity along 1.5 cm.

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Integration of Generation onto the Networks: Drivers and Technical Challenges

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The purpose of this work is to enable an increase in renewable and efficient energy generation capacity, and so to help reduce greenhouse gas emissions and subsequently global warming by counteract the technical challenges of connecting distributed resources onto the networks. The Portuguese government has set a target for the amount of energy that must be generated from renewable and efficient energy sources. A large amount of generation is expected to be connected onto the electricity distribution networks in order to meet that target. However, technical and economic challenges still need to be overcome to further increase the capacity of distribution generation (DG).

There are many technical challenges that must be considered when connecting a generating scheme to the distribution system are: steady-state voltage rise effects; thermal rating of the equipment; short-circuit fault levels may increase; protection scheme; System Reliability; transients and System Stability; and Power Quality;

The primary drivers behind the growth of DG and the current focus on its integration into electric power system operation and planning can be classified into three main categories, namely environmental, commercial and national/regulatory.

The focus of the work is identifying the technical challenges and drivers of connecting generation on the network and therefore finding opportunities for the generation to increase onto the networks.

Advantages on adding microspheres to building's paints

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Urban areas materials, such as asphalt and facades of buildings, absorb sun's radiation causing the temperature in the city center to rise up to 15 °C above surroundings. This phenomenon is called Urban Heat Island (UHI) effect.

For over two decades, paint industry has been developing methods to reduce temperature inside buildings, focusing on the increase of the total solar reflection (TSR) and the thermal emissivity (ϵ) obtained using modified paint coatings.

This project considers the incorporation of hollow glass microspheres in paint coatings, with a refractive index of *ca.* 2, for obtaining retroreflection. As the solar radiation is retroreflected, it goes directly to the space instead of being dispersed and then absorbed, contributing for decreasing the UHI. Retroreflection can be controlled in such a way that only occurs whenever the sun is high enough, which happens during the summer time and around the solar midday, allowing the sun to heat buildings during the winter time. Retroreflection can become an intelligent and powerful tool for controlling the heat load of a building and to fight the global warming.

Resistance of the geosynthetics against physical and chemical degradation – the GeoChem project

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Geosynthetics are polymeric materials widely applied in Civil Engineering structures, like waste landfills, roads, railways, tunnels, dams or reservoirs. During their lifetime, the geosynthetics can be exposed to several degradation agents, such as: solar radiation and other weathering agents, high temperatures, oxygen, chemical species like acids or alkalis and microorganisms. An extended exposure to these agents can have a negative impact on the properties of the geosynthetics, affecting their durability and shortening their service lifetime. As the geosynthetics must perform their functions for a very long period of time (in some applications, up to 100 years), it is very important to evaluate their resistance against degradation.

The main goal of the GeoChem Project is to evaluate the resistance of the geosynthetics against physical and chemical degradation. This research project, associating Chemistry with Civil Engineering, aims to contribute to a better understanding of the durability of the geosynthetics and, this way, allow a better application of these materials (taking into account the damages that the materials will suffer during their lifetime). The assurance of durability is an essential requirement for the application of geosynthetics.

In this work, the durability of the geosynthetics (geotextiles and geonets) was studied by exposing the materials to several physical and chemical degradation agents; the effect of those damaging agents was evaluated by monitoring the physical, chemical, mechanical and hydraulic properties of the geosynthetics (the results obtained for exposed materials were compared with the results obtained for reference materials).

The geosynthetics were immersed in several chemical solutions (at high temperatures and at room temperature), exposed to thermo-oxidation, exposed to ultraviolet radiation and to other weathering agents (both outdoors and in laboratory) and exposed *in situ* to the agents of the soil. The geosynthetics used in this work were specially manufactured with different chemical compositions (different polymers and chemical additives). This way, it was possible to evaluate the contribution of some additives (antioxidants, UV stabilizers and colour pigments) to the overall durability of the materials.

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Relationship between milk production and occurrence of mastitis: isolated microorganisms and infection dynamics for bovine mammary quarters

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The mastitis is an inflammation of the mammary gland, of physiology, traumatic, allergic, metabolic origin and mainly infectious [1]. Subclinical mastitis decreases the milk production, without visible signs of inflammatory process in the mammary gland or in the milk, and it is one of the biggest problems to milk exploration, due the economical loses caused by decreasing of milk production. This loss is caused by irritating action of the microorganisms on the mucous membrane, causing progressive lesion of the secretor epithelium [2]. Considering the effects of mastitis on the milk production, the present study aimed to follow the infection dynamics in animals of same flock during the period of three months and their correlation with the milk production from cows and the somatic cell count (SCC) of each positive quarter of the animals. Milk samples from 193 teats were evaluated by microbiological culture, *California Mastitis Test* (CMT) and SCC. The results of microbiological culture indicate that *Corynebacterium bovis* was the most frequently isolated microorganism on the evaluated milk samples followed by *Staphylococcus epidermidis*. The isolation of ambiental microorganisms of mastitis presents least frequency in relation to contagious agent, which emphasized bigger isolation possibility between teats by the *S. epidermidis*. The average of dairy milk production of the 50 animals evaluated sustain practically constant, tending to discreet decrease along of the time, as usually noted in milk flocks. The number of positive teats on CMT, and the SCC values presented notable variation along the study, suggesting the abrupt variation of the infection levels by the contagious mastitis microorganisms. Thus, there isn't statistical correlation between the results of CMT, SCC and the milk production.

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Traditional dry cured sausages in Modified Atmosphere Package: benefits from this packaging method

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Dry cured sausages are nowadays commonly sold in modified atmosphere package (MAP). Packaging in MA allows not only an increase in the shelf life of the products, but also higher moisture retention and stabilization, while providing an attractive and hygienic commercialization format for these traditional products. Dry cured sausages are a common foodstuff in Portuguese diet due to its high sensory quality and intrinsic characteristics of the raw material selected from pigs. Besides, they are key products in gastronomic tourism from several regions of Portugal.

The aim of this project was to determine the total fat content and fat composition of 12 dry cured sausages, from different geographical origins of Portugal, packed in modified atmosphere. A complete nutritional evaluation was performed, but special attention was devoted to the lipid amounts and its fatty acid composition (saturated, monounsaturated and polyunsaturated fatty acids, *cis/trans* isomers and the n6/n3 ratio). Soxhlet extraction (using petroleum ether as solvent) was used to quantify total fat. Fatty acids were determined by GLC/FID/capillary column as methyl esters (FAMES).

Nutritional analysis revealed high moisture levels with an average of about 46g/100g that result on low values of total fat content, ranging from 11 to 32 g/100g. Protein (22 g/100g average) and ash (5 g/100g average) contents are in agreement with published literature, but also slightly reduced. Concerning the fatty acid profile, palmitic acid (16:0), stearic acid (18:0), oleic acid (18:1*cis*9) and linoleic acid (18:2*cis*6) were the most representative fatty acids, as expected for a typical profile of processed pork meat product. Monounsaturated fatty acids (MUFA) were the major fatty acids present.

The benefits of MAP in dry cured sausages are evident. The higher content of water provides more tenderness to the sausage, less weight variations and higher hygienic standards. Nutritionally, a decrease in lipid fraction is observed, with positive health implications for the consumers. Comparing to bibliographic data and as a consequence of the decrease on lipid content, MAP dry cured sausages can be included in the diet more frequently, but always in moderate portions.

Chromium Speciation Analysis in Bread Samples

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For several thousand years, bread has been one of the major constituents of the human diet, making the baking of yeast leavened and sourdough breads one of the oldest biotechnological processes. Besides the quality of bread as a nutrient, its safety is another important aspect to be assured and can be evaluated by monitoring the putative contaminants present. These contaminants can result from both the technological procedures and the ingredients used in the bread fabrication, namely, the water, but mainly from the flour, the principal constituent of bread [1]. Cereals, the raw material of bread, are important source of minerals, about 1.5-2.5%, being phosphorus the mineral at highest concentration which is mostly associated with calcium and magnesium phytates. Potassium levels are high in wheat, rye, barley and oats, but no cereal grain is considered to be a high or moderate dietary source of sodium. Wheat, rye, barley and oats are also classified as moderate sources of calcium, magnesium, iron, zinc and copper. Wheat is also an important source of selenium and chromium. A large number of other elements are present at trace levels [2]. Among the essential elements, chromium is a controversial element with important essentiality and toxicity, depending on its different species; its speciation analysis in principal human foodstuffs, as in the case of bread, is of utmost importance. considered controversial due to its essentiality in the trivalent form, but being genotoxic when in the hexavalent oxidation state [3]. Consequently, the analysis speciation of this element is crucial.

In the present study it was determined the levels of total chromium and hexavalent chromium in 76 different bread samples of both brown bread and of white bread (total of 152 samples) obtained randomly from 20 bakeries. A method was validated, including a wet acid digestion procedure for total chromium dissolution, a selective alkaline extraction of hexavalent chromium and ETAAS determination

The total chromium contents were 47.3 ± 20.0 and 50.9 ± 22.2 $\mu\text{g}/\text{kg}$ for white bread and brown bread samples, respectively. For hexavalent chromium the values found were 5.65 ± 5.44 and 6.82 ± 4.88 $\mu\text{g}/\text{kg}$ for white bread and brown bread samples, respectively. The hexavalent chromium contents were, in terms of mean values, about 10% of the total chromium levels. Its presence can be due to both contamination by contact with metallic equipments during the technological processes of bread production and to the endogenous contents of the grains resultant from the uptake from contaminated soils by the plants. Due to the toxic properties of hexavalent chromium, and the capacity of transference of this species from the soils to the plants and grains, its control in foodstuffs is of outmost importance.

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Isoflavones composition of Arabica and Robusta coffees

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Isoflavones consumption has been associated with beneficial effects on human health (regarding hormone-related cancers, cardiovascular diseases and osteoporosis) due to their antioxidant and weak estrogenic activities. Soy and derivatives are the main sources of these compounds. Isoflavones have been also found in other products (legumes, cereals, nuts and oilseeds), although in minor amounts.

The aim of this work was to evaluate isoflavones levels in roasted coffee, embracing the two coffee species with higher economical importance, *Coffea arabica* ($n=2$) and *Coffea canephora* var. *robusta* ($n=2$), all from different geographical origins.

Isoflavones were extracted by acid hydrolysis and analysed by HPLC with diode-array detection, using 2'-methoxyflavone as internal standard.

Arabica samples contained 1.01 ± 0.09 mg of daidzein/100 g (dwb), 0.14 ± 0.07 mg of genistein/100 g (dwb) and 1.10 ± 0.43 mg of formononetin/100 g (dwb). For robusta ones, the levels were, respectively, 2.06 ± 0.33 mg/100g (dwb), 0.30 ± 0.14 mg/100 g (dwb) and 6.40 ± 1.59 mg/100 g (dwb). The results showed that it is possible to distinguish both coffee species based on their isoflavones profile, especially in what concerns to formononetin content that was six times higher in robusta coffees.

Concluding, both arabica and robusta coffees contained daidzein, genistein and formononetin, but robusta ones presented significantly higher ($p<0.05$) levels of isoflavones, especially of formononetin. Therefore, the addition of robusta coffee to commercial blends could be of interest to increase the isoflavones intake through coffee brews.

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Soybean DNA extraction from blended refined vegetable oils

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The major genetically modified (GM) crop species is soybean (*Glycine max*), accounting for 53% of the total world's GM planted area and 70% of the soybean annual production in 2008 [1]. Since the approval of Roundup Ready[®] (RR) soybean in EU, the production of soybean oil using GM seeds has been increasing. In EU, the doubts raised by the use of genetically modified organisms (GMO) lead to the mandatory labelling for food products containing more than 0.9% of authorised GMO. In blended edible oils prepared with mixtures of two or more different oils, it is important to verify the labelling statements concerning their constituents and the presence of GM material, since soybean oil is frequently used. The analysis of DNA coupled with polymerase chain reaction (PCR) has been the technique of choice to monitor the presence of GMO in food. However, it is very difficult to obtain amplifiable DNA from oil since most vegetable oils, like crude soybean oil, must be refined prior to its consumption.

In the present work, four methods were tested for their ability to extract DNA from 200 g of blended refined vegetable oils: the in-house prepared Wizard and CTAB methods and the commercial kits Wizard[®] Magnetic DNA purification system for food and Nucleospin[®], based on previous work testing several soybean food matrices [2]. The DNA extracts were evaluated for their amplifiability by PCR targeting the lectin gene as a marker for soybean and the RR event for the detection of GM material.

Results revealed that the Wizard[®] Magnetic kit and the Wizard method (the former after the pre-concentration step by centrifuging) did not allow amplifiable DNA. The CTAB method using the same pre-concentration step allowed the detection of DNA traces in some of the samples tested. The same amount of oil extracted with the Nucleospin[®] kit, enabled to obtain amplifiable soybean DNA from all tested samples labelled as containing soybean oil. These results were confirmed by real-time PCR allowing an estimation of the DNA content in these samples [3]. The results highlight the importance of the DNA extraction protocol and that the Nucleospin[®] food kit can be successfully used to produce amplifiable DNA from refined vegetable oils.

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Evaluation of DNA extraction protocols for the authentication of fruit juices

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In the last years an increasing interest was dedicated to the development of innovative tools for the quality control of fruit based products namely fruit juices. Fruits are relatively easy to authenticate when they are whole but the act of processing them into juice gives rise to the possibility of substitution with cheaper materials. Several approaches have been used in the authentication of juices including HPLC and infrared, mass and NMR spectroscopy. In what concerns molecular methods only a few have been reported for fruits and derived products notwithstanding DNA-based techniques are considered a valid alternative because DNA is a persistent molecule during food processing and can retain sequence specific information retrievable by a simple amplification reaction [1].

The aim of the present work is the definition of a suitable methodology for DNA extraction from fruit juices as the first step of the application of a plant DNA barcode system to authenticate these matrices. Food samples constitute a complex mixture containing many PCR inhibitors that may compromise the amplification of DNA. Thus, dedicated and effective DNA extraction procedures and more sensitive techniques to evaluate the amount and quality of the DNA extracted are required.

Three different DNA extraction procedures, representative of the available extraction approaches, were tested on 12 samples of nectars and 100% juices obtained from different fruits species, with emphasis on orange juices. Methods included a classical CTAB based experimental protocol, a membrane based commercial kit and an adapted commercial resin based method. DNA quantification and purity evaluation was performed by fluorimetry and UV spectrophotometry respectively. Additionally, agarose gel electrophoresis was used to visualize the extent of DNA degradation. The amplificability of extracts was evaluated by amplification with universal primers for plants.

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Real-time quantitative detection of the transgenic maize events MON810, NK603 and TC1507 in processed foods

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During the past decade, the development of biotechnology has revolutionised agriculture by the introduction of genetically modified organisms (GMO) with characteristics of agronomic interest. Despite the controversies surrounding GMO, the production of genetically modified (GM) crops is increasing, especially in developing countries. In 2008 the global area of biotechnological crops reached 125 million hectares, from which 30% corresponded to GM maize [1]. Maize is the second most important GM crop with the highest number of authorized GM events for food and feed in EU. In Europe the acceptance of GM food by consumers is controversial, and concerns about their safety persist among public opinion. The EU legislation demands the labelling of food products containing more than 0.9% of GM material (Regulation (EC) No. 1829/2003). The need to monitor and verify the presence of low levels of biotechnology-derived material in complex food products demands sensitive and highly specific analytical methods. Most methods for GMO detection and quantification are based on polymerase chain reaction (PCR), since protein-based assays are not suitable for processed food. For that purpose, polymerase chain reaction (PCR) and real-time quantitative PCR have been successfully applied.

The aim of the present work was to isolate DNA from a range of maize foods, to screen for the presence of GMO, to specifically detect MON810, NK603 and TC1507 GM events and finally confirm and quantify by real-time PCR. DNA was extracted using the Wizard or CTAB methods as described by Mafra et al. [2]. Yield and purity of DNA extracts were assessed by spectrophotometry, while amplifiability was evaluated by targeting the invertase gene of maize. The screening of GM products was carried out by qualitative PCR targeting the 35S promoter and the NOS terminator. For the positive results, two types of PCR assays were applied and adapted for each GM event tested: qualitative PCR for the specific detection and real-time PCR with TaqMan probes for confirmation and quantitative purposes.

The screening results evidenced a high level of contaminated food products (grains, flours, snacks, cornflakes, cereals, biscuits, etc.) in the Portuguese market. From the three events analysed, TC1507, MON810 and NK603, 6, 4 and 11 samples were positive for their presence, respectively, out of 50 food samples analysed. The quantitative results indicate that a more severe control should be applied as two of the products included levels above 0.9%, and none of the food products was labelled for the presence of GMO.

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Host-tailored sensors for Dopamine potentiometric measurements

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Application of veterinary medicines, such as dopamine (DA), in the food production sector have increased the meat fish production and helped saving worldwide fish resources. However, their wide use in aquaculture led to environmental and food spread of veterinary drugs [1]. DA is a biogenic amine, which functions mainly as a neuroregulator and it has been identified and quantitatively measured in different fish species. Several analytical techniques for DA determination use spectral methods such as UV/Vis, fluorescence [2], and chemiluminescence [3]. Electroanalytical methods [4] are also described in literature.

Ion-selective sensor's utility and simplicity have long been replaced by other wet analytical methods, because they offer high precision and rapidity, low cost of analysis, enhanced selectivity and sensitivity over a wide range of concentrations [5]. The design of sensing materials that are complementary to the size and charge of a particular ion can lead to very selective interactions. Therefore, MIPs may be used advantageously as sensing materials of ion-selective electrodes (ISEs) [6].

A new biomimetic sensor for DA host-guest interactions is presented. The artificial host was imprinted in different monomers. Methacrylic acid and 2-vinyl pyridine were used for this purpose for having different chemical functions and acid/base properties: carboxylic acid and aromatic amine functions, respectively. These were cross-linked with ethylene glycol dimethacrylic acid. The sensing materials are to be dispersed in PVC matrix plasticized with *o*-nitrophenyl octyl ether for a potentiometric transduction.

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Screening stick for norfloxacin detection

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Industrial aquaculture is a rapidly growing industry in many developed and developing countries [1]. For food safety purposes, fish samples must be subject of rigorous and frequent controls that ensure that residues of antimicrobials are below the maximum legal levels [2]. Norfloxacin (NOR) is one of the several antimicrobials administered to fish in aquaculture environment. Its residues are potentially persistent and may be found in fish [3] for which fish meat should be subject to routine and rigorous control by means of suitable analytical techniques.

Several analytical methods were reported for the determination of NOR. These include microbiological methods [4] or liquid-chromatographic techniques with MS [5], fluorescence [6] and/or with combination of UV, DAD or MS detection [4] direct spectrophotometry. However, these are not portable for on-line screening of antibiotic contamination.

Thus, the present method proposes a screening stick for NOR detection in farmed fish and in aquaculture water. For this purpose, NOR is complexed with iron(III) on a solid surface and the corresponding colour is measured spectrophotometrically, at 432 nm. A typical calibration curve is Absorbance = 3036 x concentration (mol/L) + 0,255, for concentrations raging from 97 to 216 mg/L. Selectivity studies are presently being developed.

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Pesticide residues in grapes for wine making

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Currently, according to the UN, world population tends to grow until the year 2050. In view of this, it is necessary to increase world food production to meet the food needs of the entire population [1]. Since the current trend towards lowering of usable agricultural land per capita, that water scarcity is increasing and the reluctance to the use of GMOs, the current most effective means to achieve the desired yield is the use of chemicals, including pesticides [2]. The massive use of agrochemicals such as pesticides, cause serious contamination of groundwater and soil [3] and entering the food chain and eventually be ingested. This does not mean that pesticides are less harmful or completely used, but implies greater control over the registration and use [4] so there is the need to establish maximum residue limits (MRLs).

This work's main goal is to quantify pesticide residues in grapes left after an intensive strategy (seven applications) with the same pesticide and to verify the concentration levels between berries that are harvested one day and ten days after each application and the date of harvest. Were also objectives of this study to check for pesticide degradation and accumulation.

Five parcels of vines, with about 1000 m² each, were used. In four plots were applied pesticides and one was left to serve as a witness, which did not apply any pesticide in the study. In each plot was assigned a different pesticide. The applications were repeated every two weeks. To carry out laboratory analysis of samples, was used gas chromatography-mass spectrometry (GC - MS). For the extraction of pesticides to be analyzed in gas chromatography was used solid phase microextraction (SPME). Samples were collected from the fifth application. Samples were taken one day after the application and about ten days later. Grapes collected were on September 17 to quantify the residue left by pesticides before they make wine and compare with the maximum residue limit recommended for each pesticide in Portugal.

It was concluded that even after seven applications with the same pesticide MRLs are not exceeded, there is degradation of pesticides when the storage of the samples exceeds the two weeks that there is an accumulation of pesticide applications and there has been identified drift of pesticides between plots.

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Antioxidant capacity of energy drinks

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Energy drinks are soft drinks that do not emphasize energy from the calories they contain, but through the presence of several compounds. These drinks may include methylxanthines (including caffeine), vitamin B, herbs, guarana, acai, and taurine, various forms of ginseng, maltodextrin, carbonated water, inositol, carnitine, creatine, glucuronolactone and ginkgo biloba. Some may contain high levels of sugar or artificially-sweetened 'diet' versions. The central ingredient in most energy drinks is caffeine, the same stimulant in coffee or tea.

Some of the above mentioned compounds may have antioxidant properties, typically correlated to the prevention of degenerative diseases such as cancer and alzheimer. The ingestion of energy drinks may therefore turn out an advantage. This feature depends on their antioxidant capacity (AC), a measure of the degree of inhibition of oxidative processes provided by these beverages. The corresponding values may provide relevant information about the level of protection exerted by these drinks against oxidative cellular damage.

ACs of energy drinks were determined and evaluated in the present work by means of optical methods, all of them regarding the inhibition of free radicals in aqueous media. These were FRAP (Ferric ion reducing antioxidant parameter), TEAC (Trolox equivalent antioxidant capacity), ORAC (oxygen radical absorbance capacity) and TRAP (total radical trapping antioxidant parameter) methods. Each method had its own characteristics, and differences existed in free radical generating system, molecular target, end-point, time of residence in reaction medium, etc. [1].

Values were calculated for a standard antioxidant acting as reference. Ascorbic acid was selected for this purpose. The methods used were FRAP and TRAP. The results pointed out statistical differences among the analyzed drinks.

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FIA spectrophotometric system for the assessment of antioxidant capacity of commercial drinks by TRAP method

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The beneficial effects of flavoured waters are generally attributed to the antioxidant capacity (AC) of their additives, namely flavours; that activity plays an important role on the prevention of degenerative diseases as well as food spoilage [1]. AC is the ability of an element to disable free radicals. This process inhibition increases the lifetime of foodstuffs and at the same time the degree of antioxidant protection evidenced by biological systems. The evaluation of food's AC can be made by different conventional optical methods, discussed in the literature [2]. Generally these methods have a common substrate, an oxidizing agent and an antioxidant compound. TRAP method is one of those methods, and has the advantage of being quick and easy to perform, providing high analytical signal.

The present study was conducted to further investigate the influence of ascorbic acid on antioxidant capacity using a flow injection analysis system. The AC was evaluated using the conventional method TRAP, Total Radical trapping Antioxidant Parameter, and ascorbic acid as reference [3]. Ascorbic acid is a vitamin that has commonly known antioxidant properties.

In this work, the AC was determined by measuring the absorbance decrease of the radical cation ABTS^{•+} that has an intense blue color in a flow-injection analysis set-up. This absorbance decrease is provided by the antioxidant. The radical was generated by a reaction between ABTS 150 µmol/L and AAPH 4 µmol/L diluted in acetate buffer, 50 mmol/L, pH 4.3. This TRAP solution was incubated at 45 °C, for 90 minutes, and then cooled to room temperature. The flow set-up operated in double-channel, carrying TRAP solution and a suitable buffer; these were mixed in a reaction coil. Ascorbic acid standard solutions were injected, and the absorbance was measured at 734 nm. Preliminary results of this flow system showed a linear range of 4-30 mmol/L and an analytical performance of 7×10^{-6} in terms of slope and correlation coefficient 0.9985.

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Quantification of expression of two enzymes from the lignin synthesis pathway on corn stalk collected at three ages

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1. Objectives

The objective was to identify genes responsible for lignification in maize cultivars, resulting in decrease of fiber digestibility, since cell-wall lignification of tropical forages has been viewed as the main obstacle for microbial fermentation in the rumen¹.

2. Material and Methods

Fifteen hybrids from the Instituto Agronômico de Campinas breeding program were evaluated in a random block design with three repetitions, harvested with 90, 120 and 150 days after germination. The 4th and 5th stalk internodes were removed for determination of chemical composition and *in vitro* digestibility. Samples of the 4th internode above group were analyzed for *in vitro* NDF rumen digestibility (IVNDFD), and the cultivars were separated in two groups with fast or slow decline of NDF digestibility, with 3 cultivars in each group.

Total RNA from 54 samples (6 cultivars, 3 blocks, 3 ages) was extracted according to the protocol of Chomczynski e Sacchi². After quantification of total RNA, the three blocks from each maize cultivar were grouped in a single tube totaling 18 samples for DNaseI treatment and cDNA synthesis.

The quantification of gene expression was done by real-time PCR in an *ABI StepOne™ Sequence Detection System*® (Applied Biosystems Foster City, CA, USA).

3. Results

There was no effect of treatment or age on the expression of the gene COMT. Expression of C4H was altered by age, increasing C4H expression with advance in maturity (Table 1). There was a significant Treatment x Age interaction for the expression of C4H, with expression increasing with age only at the SLOW group, composed by three cultivars that maintained IVNDFD with advanced maturity. There was no effect of age on the expression of C4H for the group with FAST decline of IVNDFD with advance in maturity (Tabela 1).

Table 1. Quantification of gene expression for two enzymes from the lignin synthesis pathway in maize cultivars with either fast or slow slope of decline of rumen digestibility with advance in maturity.

Treatment	Age	Genes ¹	
		COMT	C4H
SLOW	30	0.83	-3.25 ^A
	60	0.68	-0.01 ^B
	90	1.82	-0.18 ^B
FAST	30	1.53	-1.85 ^A
	60	1.76	-0.78 ^A
	90	0.96	0.02 ^A
Significance <i>P</i>	TRT	ns	ns
	AGE	ns	<0.05
	TRT*AGE	ns	<0.05

¹Values of dCT (Ct GAPDH – Ct target gene)

Means with different caps letters at the same column are different at $P < 0.05$.

4. Conclusions

The expression of the C4H gene increased with advance in maturity being correlated with the decline in digestibility of the stalks. However, the expression of these two enzymes did not explained the differences in fiber digestibility between the two groups of maize cultivars.

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Gunshot residues analysis on the hands of shooters by SEM/EDX - Applicability to Legal Medicine

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Establishing the manner of death in cases of gunshot wounds may be difficult in routine forensic practice, especially when deciding between homicide and suicide. In such cases, the gunshot residue (GSR) particles can escape from the firing chamber through the muzzle or the breeches and are blown at once onto the immediate surfaces of the firearm, including any hand in contact with it. According to *Molina et al.*, in an article published in 2007 [1], «while GSR may be helpful in confirming the manner of death, it cannot and should not be used to differentiate suicide from homicide», as GSR by SEM were only positive in 50% of the cases studied and only 18% of these yielded a specific pattern as to how the firearm was held. In the same article, the authors also argued that these results vary from one type of firearm to another, so that a negative test may yield more information than a positive one. More over, the types of weapons analysed were not the ones usually found in the Portuguese setting.

Experimental shots were done in a controlled environment (fire range), mimicking a intermediate range shot (50 cm) and using one of the most commonly firearms seen in the Portuguese setting (calibre 6.35 mm). Timed samples were taken, the first of which right after the shot (hour 0), and then 1, 3, 6 and 12 hours after the shots. Subjects were asked to perform their daily routine, taking notes of their activity, so that these could be tracked and taken into account when analysing the data. The goal was to provide a critical view on the importance of time lapse between the shot and the collection of samples, in actual cases.

Several different methods can be employed to test for GSR (the metallic components of such residues) on a deceased person's hands, including scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDX). This is a powerful tool, providing morphological and analytical information for single particles in a non-destructive way and allowing the «maximum specificity» in GSR detection. It is a straightforward method, allowing the confirmation of the presence (or absence) of GSR particles – it provides a positive/negative result. [2] This method can be used, not only to identify GSR, but also to make a comparative quantification in regard to spatial distribution (back/palm of the hand).

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Trace elements in hemodialysis patients: a survey of the Cu, Zn, Se and Mn status in a Portuguese population

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Because they lose one major route of trace elements excretion and are systematically exposed to a potential source of deleterious trace elements (the dialysis fluid), patients with end-stage renal disease (ESRD) undergoing maintenance dialysis therapy are at risk for deficiency of essential trace elements and excess of toxic trace elements [1,2]. Moreover, some essential trace elements may be lost through the dialysis membrane [1].

A recent systematic review of existing literature on trace element status in hemodialysis patients [2] showed that average blood levels of biologically important trace elements were substantially different in hemodialysis patients, compared with healthy controls: levels of trace elements such as cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb) and vanadium (V) were higher while levels of manganese (Mn), selenium (Se) and zinc (Zn) were lower in hemodialysis patients. Considering the biological importance of these later trace elements (Mn, Se and Zn) and the impressive mortality due to cardiovascular, infectious and neoplastic disease in these patients, the definite confirmation of these findings and, eventually, well-controlled randomized interventional studies, examining the potential therapeutic benefit of appropriate supplementation, are considered of up-most importance [1].

Based on this background, we began conducting a monitoring study of Cu, Zn, Mn and Se serum levels in a Portuguese population of hemodialysis patients (ca. 50 persons). Some preliminary results on Zn and Cu (two blood collections, three months apart) are yet available. Copper was found to be in the middle of widely accepted reference (“normal”) interval (70-140 µg/dL) [3]. Our results for Cu were: 108 ± 24 µg/dL (mean \pm sd), ranging from 68 to 195 µg/dL. Zinc, however, was found to be lower than normal (i.e., < 80 µg/dL) [3]. Our results for Zn were: 77 ± 14 µg/dL (mean \pm sd), ranging from 50 to 108 µg/dL. These data confirm that most maintenance hemodialysis patients suffer from zinc deficiency.

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Comparison of Etest with the CLSI reference broth microdilution protocol for antifungal susceptibility testing of clinical isolates of *Aspergillus* spp.

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During the last few decades the incidence of invasive fungal infections (IFI) has increased dramatically, especially in immunocompromised and critically ill hospitalized patients, with *Candida* spp. and *Aspergillus* spp. as the most common etiological agents [1]. Although new antifungal drugs have been recently developed, there are only three classes in use against invasive aspergillosis. First line recommendations are amphotericin B and the triazoles, while the echinocandins are alternatives [2].

The aim of the present work was to compare the Etest® method (bioMérieux) with the Clinical and Laboratory Standards Institute (CLSI) reference broth microdilution protocol M38-A2 [3]. For that purpose, minimal inhibitory concentrations (MICs) and minimal effective concentrations (MECs) were measured for amphotericin B, the triazoles voriconazole and posaconazole, and the echinocandins caspofungin and anidulafungin against *Aspergillus* spp. Twenty clinical isolates, including eight *A. fumigatus*, six *A. niger*, five *A. terreus*, and one *A. flavus*, obtained from respiratory secretions and bronchial or bronchoalveolar lavages were tested. Agreement rates within two doubling dilutions between the methods were calculated.

Although categorization of filamentous fungi susceptibility is not established yet, according to the working breakpoints published in M38-A2 [3] the isolates were susceptible to the tested drugs, with few exceptions. The overall agreement between the methods was higher than 70%. Regarding the drugs, voriconazole showed the lowest agreement, with most Etest® results more than two dilutions below the reference MICs/MECs. Posaconazole showed the best correspondence, while amphotericin B and the echinocandins were in close accordance with the overall result. No difference was seen between the tested species.

The work indicates a good overall agreement between the methods, with the exception of voriconazole, in which case Etest® does not appear to be a suitable alternative when testing *Aspergillus* spp. In fact, it appears to bear the potential to lead to false-susceptible categorization in the clinical setting.

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Fat-soluble vitamins in cow milk commercialized in Portugal

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Cow milk and dairy products have a long tradition in human nutrition. From the first day of our life until elderly, the milk accompanies us step by step, bringing many benefits to our development. Milk and milk products are nutritious food items containing numerous nutrients (proteins, essential fatty acids, conjugated linoleic acid, omega-3 fatty acids, short- and medium chain fatty acids, vitamins, minerals, other bioactive compounds) that promote positive health effects. Milk consumption varies considerably between different countries. According to the INE, National Institute of Statistics, the consumption of milk and dairy products in Portugal has a positive development in recent decades, and this food group registered the highest per capita growth (+41%) from 2005 to 2008.

The objective of the present work was to compare chemically different milk brands commercialized in Portugal in terms of fat-soluble vitamins. The evaluated compounds included vitamin A, D (D2, D3 and proD3), E and pro-A (β -carotene). A liquid-liquid extraction method was optimized for this purpose. All the studies were carried out in the presence of BHT (antioxidant) and adequate internal standards. The chromatographic conditions were also adjusted, with the more effective resolution being achieved using a gradient of acetonitrile/water/ethyl acetate on a C18 reversed phase. The detection was carried out simultaneously by UV (diode-array) and fluorescence (λ_{ex} = 290 nm; λ_{em} = 330nm).

When comparing milk brands with the same labelled fat content, all vitamins were present, with exception of vitamin A acetate, which is only present in fortified foods. Vitamin E was the major compound among the liposoluble vitamins. These results are important because milks with the same fat content are not always associated with the same amount of liposoluble vitamins, a relevant information regarding their nutritional quality.

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Structure-activity profiling of cocaine interaction with biomembrane models

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Present understanding that drug addiction is a chronic brain disease paves the way for pharmacotherapy. Its ideal goal is to enable a patient to maintain permanent, voluntary abstinence. However only provisional goals, such as reduced drug use, improvement of patient's functioning in the society, and minimization of addiction-related health and social hazards have been attained yet [1]. Nevertheless, the last decade brought a considerable progress in the pharmacotherapy of addiction. Basing on recently gained knowledge on the addiction mechanisms and on the physiology of the brain reward system, several therapeutic strategies have been evolved, namely those aimed at reduction of the transport of molecules of addictive substances into the brain. The approaches involve, for instance, the preparation of antibodies that form complexes unable to cross blood-brain barrier or the use of enzymes that can accelerate the metabolism of the compounds in the blood. The last process has the advantage of operating by means of an endogenous response that is independent of the central nervous system, thus circumventing the problem of neurotoxicity [1]. Accordingly, any research efforts directed to amplify the knowledge of biological and chemical molecular mechanisms of the drugs of abuse are found to be vital to decode the addiction problem.

In recent decades cocaine has become one of the most abused psychomotor stimulant drugs. Cocaine is the main alkaloid of *Erythroxylon coca*, a shrub that grows abundantly in the Andean Highlands and northwestern parts of the Amazon in South America. The molecular mechanisms of cocaine interaction with macromolecules, owing to the complexity of cellular systems, are not known yet. As a result, substantial work at various levels is currently required to establish the connection between the molecular mechanisms and addition activity.

With the aim of acquiring information on the relationship between structure and activity the study of the interaction of cocaine and its main metabolites with biomembranes, and in particular the analysis of the outcome of the acid/ester functions in the mentioned contact, has been carried out in the present project. In this context multilamellar vesicles have been used as membrane model since they are well-established biomimetic systems [2]. The drug- or metabolite- membrane interaction(s) were monitored by differential scanning calorimetry (DSC) and electrochemical experiments. The preliminary results will be presented in this communication.

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Prevalence of plasmid-mediated quinolone resistance genes *qnr* and *qepA* in *Salmonella* isolates from different sources of Portugal

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Plasmid-mediated quinolone resistance is emerging worldwide in *Enterobacteriaceae*, including *Salmonella*. Resistance to quinolones has been mainly attributed to chromosomal alterations in the target enzymes DNA gyrase (GyrA and GyrB) and topoisomerase IV (ParE and ParC) or by changes in drug entry and efflux. Three major mechanisms of plasmid-mediated quinolone resistance (PMQR) has been reported in enterobacterial species, associated to the acquisition of the *qnr* (topoisomerase protection), *qepA* (quinolone efflux pump) or *aac(6')-Ib-cr* genes (acetylate amino glycosides, norfloxacin and ciprofloxacin).

In this study, the occurrence of *qnr* (*qnrA*, *qnrB* and *qnrS*) and *qepA* genes was investigated among 318 nontyphoidal *Salmonella* isolates from human clinical sources, food products and environment with decreased susceptibility to a fluoroquinolone (ciprofloxacin or enrofloxacin). Antibiotic susceptibility to various antibiotics, including ciprofloxacin or enrofloxacin, was determined by the agar dilution method (CLSI) or by E-test. The *qnrA*, *qnrB* and *qnrS* and *qepA* genes were screened by PCR using primers and conditions as described previously. Twenty per cent of the isolates obtained from the National Centre of *Salmonella* (INSA, Lisboa, Portugal) exhibited decreased susceptibility to ciprofloxacin, being the serotype Enteritidis isolated from human and poultry products the main contributor to this phenotype. None of the isolates was found to be positive for *qnrA*, *qnrB* or *qepA*. The *qnrS1* gene was detected in a single clinical isolate from 2003 of the serotype Enteritidis, a serotype commonly implicated in human infections and poultry-associated. The isolate was identified by MLST as ST11 (<http://mlst.ucc.ie/>) and presented a PFGE profile identical to a predominant multidrug resistant *S. Enteritidis* strain of our collection. Further characterization of the *qnrS1*-positive *S. Enteritidis* isolate identified this gene in a conjugative IncN plasmid of ca.30Kb.

Being quinolones considered a *critically important* class of antimicrobials for use in human medicine it is mandatory to establish the contribution of animals for human consumption in the emergence of acquired resistance mechanisms to quinolones.

Differences on adenosine modulation of calcium uptake into synaptosomes of the hippocampus and neocortex of patients with mesotemporal lobe epilepsy (MTLE)

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Adenosine is a ubiquitous homeostatic substance that acts as an “endogenous anticonvulsant”. Adenosine builds its actions through the activation of four distinct G-protein-coupled receptor subtypes (A_1 , A_{2A} , A_{2B} and A_3). Adenosine controls predominantly excitatory glutamatergic synapses through its action on inhibitory A_1 receptors, which are highly abundant in the central nervous system. Adenosine attenuates neuronal activity by pre-synaptically inhibiting neurotransmitter release and by controlling neurotransmitter responsiveness at post-synaptic sites [1]. Unbalanced adenosine modulation is implicated in pathological situations resulting from excessive function of glutamatergic pathways, such as epilepsy. The large increase in adenosine levels during epileptic discharges occurs due to an increase in metabolic demand and increased neuronal firing frequency [2]. The hippocampal region is highly susceptible to stressful situations. Controversy, however, exists concerning the role of adenosine on epileptic hippocampi perhaps because adenosine neuromodulation in this region might result from a balance between inhibitory A_1 and facilitatory A_{2A} responses [1]. In this study, we investigated the modulatory effect of endogenous adenosine (using adenosine deaminase and subtype selective adenosine antagonists) and of the A_1 receptor agonist, R-PIA (100-300 nM), on calcium uptake into brain synaptosomes depolarized with veratridine (10 μ M, a selective Na^+ channel opener), measuring the uptake of ^{45}Ca or fluorescence signals resulting after loading the synaptosomes with the calcium dye, Fluo-4NW. Synaptosomes are pinched-off nerve endings who exhibit excellent functional capabilities *in vitro* [3]. We compared synaptosomes isolated from rat brain hippocampus or from human hippocampal and neocortical tissue isolated from drug-resistant patients with mesial temporal lobe epilepsy (MTLE). The results show that depolarization-induced ^{45}Ca uptake into hippocampal synaptosomes of a cadaveric organ donor was modulated tonically by adenosine acting predominantly via inhibitory A_1 receptors (shown by the facilitatory effects of ADA 0.5 U/ml and DPCPX 2.5-100 nM). We could not, however, exclude a role of facilitatory A_{2A} receptors revealed by the inhibitory effect of ZM241385 (50 nM). Similar results were also detected on synaptosomes isolated from the rat hippocampus and from the neocortex of MTLE patients, which is taken as an internal control for the epileptic hippocampus. R-PIA (100-300 nM) concentration-dependently decreased fluorescence calcium signals in synaptosomes isolated from the rat hippocampus and from the neocortex of MTLE patients. The inhibitory effect of R-PIA was antagonized by DPCPX (50 nM), highlighting the involvement of adenosine down-modulatory action on voltage-sensitive calcium channels through A_1 receptors. In contrast to the results obtained using synaptosomes isolated from cadaveric tissue and from the neocortex of MTLE patients, the adenosine A_1 inhibitory tonus is hard to detect and might be impaired in the sclerotic hippocampus from drug-resistant MTLE patients.

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Antioxidant capacity of commercial beers: effect of the method

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The antioxidant capacity (AC) of beers was studied by means of its determination and evaluation in commercial beers. The AC indicates the degree of protection of a certain organism against the radical oxidative damage, correlated to degenerative diseases [1]. The AC was determined by several methods, such as (i) Total radical trapping antioxidant parameter (TRAP); (ii) Trolox equivalent antioxidant capacity (TEAC); (iii) Trolox equivalent antioxidant capacity (DPPH); (iv) Ferric ion reducing antioxidant parameter (FRAP); (v) Cupric reducing antioxidant capacity (CUPRAC); (vi) Oxygen radical absorbance capacity (ORAC). These are optical methods based on the inhibition of free radicals in aqueous solution. Ascorbic acid (AA), Gallic acid (AG) and Trolox (TR) were used as standards [2-5].

Considering that each sample (27 samples of 5 brands) was tested by several methods and displayed considerably different AC values, the effect of the method was evaluated. This was made by ANOVA statistical analyses (analysis of variance).

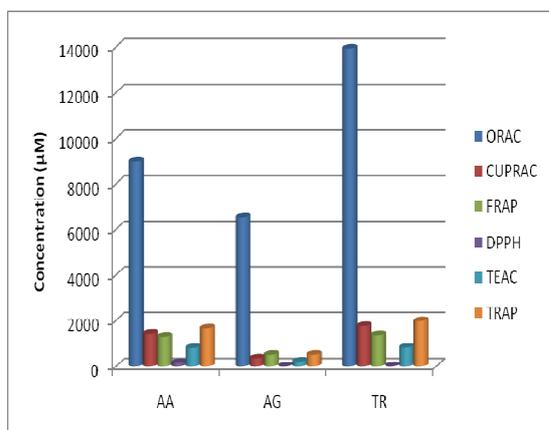


Fig.1 – Effect of the method.

The effect of the method was tested individually, for each standard (Fig. 1). Results showed that, for all standards tested, the AC was higher for ORAC method and lower for DPPH. TRAP, TEAC and FRAP had similar values for all standards.

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Conjugated linoleic acid (CLA) contents in bovine meat

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Consumers are increasingly aware of the benefits of food on health and disease prevention, therefore seeking accurate information to support their food choices. Animal products, particularly red meat such as beef, are often linked to a high fat content, mainly saturated. However, meat is an important source of both essential amino acids and micronutrients such as iron, selenium, vitamins A, B12 and folic acid. More recently, researchers have focused their attention on a particular component of ruminant's fat, present in their meat, milk and derivatives – the conjugated linoleic acid (CLA)¹. These fatty acids have been recognized to be beneficial to human health, namely on cancer, cardiovascular disease, and diabetes. CLA is also related with immune system modulation, bone metabolism regulation, and body fat control.

The aim of this study was to quantify CLA contents in bovine meat. Two different meat portions were collected from each animal, chosen among the more frequently consumed: one leaner “picadouro” and other of higher fat content “óculo”. A total of 20 animals of different ages were analyzed, 10 females and 10 males. The fatty acids profile was assessed using gas chromatography, after direct transesterification, based in the method of Murrieta et al. (2003)² with some modifications.

Preliminary results for CLA levels showed a high variation between animals, with the younger animals presenting the highest CLA amounts per g of meat, with no clear differences between genders. More consistent differentiations were observed for each animal between the two meat portions, with “óculo” presenting clearly higher CLA amounts per g of meat. The higher CLA contents are proportionally associated with the meat fat amount, therefore raising the issue on the healthier choices: leaner meats provide less CLA.

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Risk Analysis; Hygiene and Sanitary Conditions of School Canteens

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Over the last years, food safety has been considered the essential factor for health promotion. The supply of meals at the kindergarten and primary schools, should guarantee a nutritionally balanced meal that suits students needs, following the general food hygiene and safety norms.

The main purpose of this study was to improve the knowledge about the conditions of food preparation, cooking and distribution of meals at school canteens at North Coast municipality of Portugal, through evaluations of the facilities concerning the structure, sanitary and hygiene conditions. Additionally we intended to determine the appropriate interval between inspections through the application of a risk matrix.

It was developed a descriptive and transversal study at 37 school canteens of official kindergartens and primary schools.

Collection of data was made using grids of hygiene and sanitary conditions, one for the canteens with cooking step and another for the canteens that only receive the meals already cooked. In generally, it was possible to realize that canteens had acceptable hygiene and sanitary facilities conditions. Among structural non conformities, it was highlighted the lack of exclusive lavatories, properly equipped for the hands washing at the reception zone (100%) and inexistence of toilets and dressing rooms in several canteens (43%). In the majority of the canteens (75,5%), the period between inspections should be of 3 months.

Grids of Hygiene and Sanitary Conditions assessment for School Canteens

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Over the last years, food safety has been considered the essential factor for health promotion. The supply of meals at the schools, should guarantee a nutritionally balanced meal that suits students needs, following the general food hygiene and safety norms.

In this context, were developed two systematic and quantified grids able to objectively analyze the hygiene, physical facilities and environment and sanitary conditions of the school canteens, either individually or grouped, allowing characterizing the studied establishments. Moreover, it is an enormous effort for the standardization of evaluation criteria, so necessary to know correctly and consistently the reality of this sector, allowing acting at the level of Food Safety, as a priority, and the Food Quality, as added value.

Development and characterisation of polymeric nanoparticles containing siRNAs for antiapoptotic proteins

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RNAi with small-interfering RNAs (siRNAs) is a conserved mechanism of post-transcriptional gene silencing which is highly gene-specific, potent and therefore potentially relevant as a therapeutical tool to overcome resistance to anticancer drugs. Indeed, siRNAs have been successfully used to downregulate the expression of targeted mRNAs in cancer cell lines (1). However, the successful delivery and physical stability of these small double-stranded RNA molecules has several obstacles: siRNAs are negatively charged hydrophilic molecules that show instability in biological fluids leading to a poor bioavailability and they show poor intracellular penetration.

Incorporation of siRNA in nanoparticulate systems offers a good protection of these molecules against metabolization, because in this form they are completely isolated from the nuclease rich environment *in vivo*. Moreover, the use of a carrier system, such as a nanoparticles, improves the intracellular delivery of siRNA molecules (2).

The development of polymeric nanoparticles for drug delivery is an area already under development at CEQUIMED-UP (3). The main goal of this project, which is currently under development, is to incorporate selected siRNAs for anti-apoptotic proteins into biodegradable polymeric nanoparticles as tools for gene silencing in order to circumvent cancer drug resistance.

Optimized delivery of siRNAs, which have been designed to downregulate antiapoptotic proteins, encapsulated into nanoparticles, may represent a putative therapeutic strategy towards chemotherapeutic sensitization of chemoresistant cancers.

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New approaches for estimating the post-mortem interval: Direct skin surface analysis using FTIR spectroscopy

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The estimation of time since death, the so called “**postmortem interval**” (PMI), is a main issue in forensic sciences and one of the most challenging problems for pathologists. Most methods currently employed have considerable inaccuracy [1].

FTIR (Fourier Transform Infrared) spectroscopy is a powerful tool for identifying types of chemical bonds in a molecule by producing an IR spectrum that is like a molecular “fingerprint”. In its variant “attenuated total reflectance” (ATR), FTIR spectroscopy is widely used to study human skin. Drug absorption studies are a typical application. These studies are generally done with in-compartment ATR accessories, and the sample must be brought in contact with the ATR crystal within the spectrometer sample compartment. More recently, however, *in-situ* skin analysis by ATR has been extended outside the box using mid-infrared fiber optics [2]. In the last years, FTIR spectroscopy has also been applied to clinical studies (e.g., the diagnosis of tissue pathologies). Results obtained consistently proved that the spectral information is sufficient to distinguish between various tissue structures and also to study disease processes at a molecular level. Very recently also, studies reporting the application of FTIR spectroscopy to study the postmortem decomposition processes in rat lung and brain tissues were published, and results suggested correlation with PMI [3,4].

In the scope of our Project* we are studying the utilization of FTIR spectroscopy to directly test the human skin for possible chemical changes occurring after death that may correlate with PMI. Studies performed to date aimed to test the data acquisition procedure / conditions, and particularly the best body areas for skin analysis. Postmortem studies in animal models (chicken) showed promising results. Postmortem studies in humans are currently being performed.

Acknowledgements: To University of Porto and Santander Totta for financial support.

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Atrial “chrono-selectivity” of adenosine via A₁ receptors is compromised by blocking cardiac Ca_v1 (L-type) channels

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Adenosine elicits a wide variety of cardiovascular effects, which are predominantly mediated by the two most abundant receptors in this territory, A₁ and A_{2A}. Controversy exists on the exact role of the nucleoside to control heart rate. In isolated spontaneously beating atria, adenosine decreases the rhythm of contractions via A₁ receptors activation. On the contrary, myocardial perfusion imaging using adenosine or A_{2A} receptor agonists as coronary vasodilators is accompanied by a significant sinus tachycardia. The exact mechanism for these effects remains to be elucidated. Small-conductance Ca²⁺-activated K⁺ channels (SK channels, K_{Ca2} channels) have been recently reported in cardiac myocytes, where they aid in integrating changes in intracellular Ca²⁺ with membrane potential. It is also well known that ‘Ca²⁺ sparks’ are more frequently seen at the periphery (500 sparks.s⁻¹) of the myocardial fibre, compared with the centre (100 sparks.s⁻¹) where contraction myofibrils exist. In this context, the purpose of this study was to investigate the effects the adenosine A₁ receptor agonist, R-PIA (0.001-1 μM), on spontaneously beating rat atria in the absence and in the presence of apamin (30 nM, a SK channel blocker) or nifedipine (1 μM, a Ca_v1, L-type, channel blocker), two drugs that putatively manipulate excitability selectively in atria vs ventricles. For comparison purposes, we also tested the effects of the muscarinic M₂ receptor agonist, oxotremorine (OXO, 0.01-3 μM), in similar experimental conditions.

The experiments were performed on isolated atria from Wistar rats continuously superfused with Tyrode’s solution gassed with 95% O₂ + 5% CO₂, at 37°C. Isometric muscle tension of the samples was continuously monitored on a computer screen via a PowerLab data acquisition system (Chart 5, v.4.2 software; AD Instruments, USA).

OXO (0.01-3 μM) exerted concentration-dependent negative chronotropic and inotropic effects, with maximal effects of 98.7±1.3% and 95.8±4.2% both attained at 1 μM, respectively. The effects of OXO were significantly (P<0.05) shifted to the right in the presence of the M₂ receptor antagonist, AF-DX 116 (10 μM). R-PIA (0.001-1 μM) concentration-dependently depressed spontaneous atrial contractions. Interestingly, the negative chronotropic effect of R-PIA (IC₅₀~30 nM) was evidenced at much lower concentrations than the negative inotropic action (IC₅₀~1 μM); the latter was confirmed after atrial electric pacing. Negligible negative chronotropic and inotropic effects were detected with the selective A_{2A} agonist, CGS 21680C (0.001-1 μM). The effects of R-PIA (0.001-1 μM) were significantly (P<0.05) shifted to the right by the A₁-receptor antagonist, DPCPX (2.5-100 nM), but not by the A_{2A} antagonist, ZM 241385 (10-100 nM). Co-application of nifedipine (1 μM), which reduced chronotropism and inotropism by a similar proportion (30-40%), sensitized atria to the negative inotropic action of R-PIA, without affecting the nucleoside chronotropic effect; the same was not observed with OXO (0.01-3 μM), where nifedipine roughly had no interference. The cardiodepressant effects of OXO (0.01-3 μM) and R-PIA (0.001-1 μM) were not affected by apamin (30 nM) and, thus, are independent of K_{Ca2} (SK) channels activity.

Data indicate that adenosine acting via A₁ receptors is a “chrono-selective” atrial depressant as compared to the M₂ agonist, OXO, and to the Ca_v1 (L-type) channel blocker, nifedipine. Atrial sensitization to the negative inotropic action of A₁ receptors must be taken into account whenever adenosine is co-applied with nifedipine.

This work was supported by FCT (FEDER funding, UMIB-215/94). B. Bragança was in receipt of a Young Investigator Fellowship from FCT (BII/UMIB-ICBAS/2009-2).

Erythrocyte aging/damage in chronic kidney disease patients under haemodialysis and recombinant human erythropoietin therapy

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The red blood cell (RBC), presents a limited biosynthesis capacity and poor repair mechanisms. Whenever exposed to physical and/or chemical stress, RBC suffers and accumulates physical and/or molecular damage. RBC ageing is associated with increasing density and decreasing activity of several enzymes and modifications in membrane proteins, which ultimately may lead to its destruction. RBC membrane band 3 protein cleavage, clustering or exposure of unusual epitopes, trigger the binding of specific anti-band 3 autoantibodies and complement activation, marking RBC for death.

In previous *in vivo* studies, the team found an abnormal band 3 profile in RBC damage. Older and damaged RBCs presented higher band 3 aggregation and lower fragmentation. Younger RBCs showed reduced aggregation and higher fragmentation.

The introduction of recombinant human erythropoietin (rhEPO) therapy in haemodialysed patients, allowed correction of their anaemia; however, 5-10% of patients show a resistance to rhEPO therapy. The team observed in non-responder patients modifications in RBC membrane proteins. However, this work was performed in the whole RBC population, without separation of RBC fractions, which may mask some oxidative stress-related modifications.

Our aim was to study RBC fractions with different densities/age, from haemodialysed patients under RhEPO therapy; to evaluate the effect of haemodialysis procedures on such subpopulations. A group of 5 haemodialysed patients was studied; clinical and laboratorial evaluation was previously performed. Blood collection was performed before and after haemodialysis. Basic clinical and analytical data included: age, gender, body weight, BMI, time on dialysis, haemogram and reticulocyte count, density centrifugation of all washed RBCs, RBC count, and preparation of RBC membranes for quantification of proteins in the different erythrocyte fractions, evaluation of band 3 profiles in the different RBC fractions. The results were analyzed in order to study the differences between CKD patients before and after haemodialysis, as well as, the modifications occurring with increasing RBC density/aging.

We found that haemodialysis procedure imposes the removal of the oldest RBCs that are not able to overcome the physical and metabolic stress imposed by the haemodialysis procedure, and the development of oxidative stress as suggested by the increase in MBH. Our data also confirm that this increase in MBH is associated with characteristic changes in band 3 profile. We also observed an increase in cell volume and a decrease in cell haemoglobin concentration. Moreover, we found that haemodialysis imposes a decrease in spectrin for all RBC fractions, except for the less dense with the youngest reticulocytes.

Protein and non-protein nitrogen fractions of commercial milk samples

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Interest in the protein content of milk is increasing worldwide, probably related to the growing proportion of the milk produced that is used in manufactured products. In addition, human health concerns about animal fats result in development of milk pricing systems that place less economic emphasis on milk fat and more on milk protein.

The Kjeldahl procedure accurately measures the total N content of milk. Typically, the protein content of milk is measured as total N-Kjeldahl times 6.38 [1-2]. The N-containing portions of milk can be divided into three broad fractions, including casein, whey protein, and non-protein nitrogen (NPN). Of the total milk N, approximately 78.5% was associated with the casein fraction, 16.5% with the whey protein fraction, and 5.0% with the NPN fraction [1].

Nitrate and nitrite contents of pasteurized milk samples are generally low, with mean contents of 0.66 mg kg⁻¹ NO₃⁻ and 0.07 mg kg⁻¹ NO₂⁻, respectively [3]. The concentration of nitrate in milk is usually determined after reduction to nitrite by cadmium. Nitrite in the reduced and unreduced samples is determined using a spectrophotometric method [3-4].

The purpose of this study was to assess the contents of protein and non-protein (nitrate and nitrite) nitrogen fractions in milk. A total of 22 milk samples of Portuguese pasteurized milk obtained from supermarkets in Oporto region were analyzed, as part of a broader monitoring program. Different milk fat contents were considered, as well as conventional and biological milks.

As regards to protein nitrogen, values in the range 2.84 – 3.36 g/100 g were observed, while nitrite and nitrate contents were lower than 0.05 and 0.15 mg kg⁻¹, respectively.

Acknowledgments

The authors wish to thank University of Porto for the funding through the program “Iniciação à Investigação – Projectos Pluridisciplinares 2009”.

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Effect of colchicine on p-glycoprotein expression and activity in caco-2 cells

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The Caco-2 cell line is one of the most widely used human cell culture models. These cells derived from human colorectal adenocarcinoma and have been accepted as a reliable in vitro model for intestinal drug excretion mediated by P-glycoprotein (P-gp) studies. P-gp is an ATP-dependent efflux pump encoded by the MDR1 gene in humans, which is highly expressed in several cancer cells conferring a multidrug resistance phenotype.

P-gp is inducible by many drugs including dexamethasone, rifampicin, the herbal antidepressant St John's wort (hyperforin and hypericin) and chemotherapeutic agents, namely doxorubicin, daunorubicin and vinblastine. The sensibility of P-gp from Caco-2 cells to different inducing compounds is yet to be clearly established. Colchicine is a toxic natural product and secondary metabolite, originally extracted from plants of the genus *Colchicum* – *Colchicum autumnale*. This compound is used as an anticancer drug and was already reported as a P-gp inducer. Thus, the main objective of the present work was to evaluate the potential changes in P-gp expression and activity, when Caco-2 cells are exposed to Colchicine.

Caco-2 cells were exposed to a range of Colchicine concentrations (0.1 μ M – 100 μ M), for a maximum period of 96 hours. Colchicine cytotoxicity was evaluated at different time points by the MTT assay. P-gp expression and transport activity were evaluated by flow cytometry, using a fluorescein isothiocyanate conjugated antibody (CD243) and the P-gp fluorescent substrate rhodamine 123, respectively. The obtained results suggest that Colchicine is cytotoxic for all the tested concentration when Caco-2 cells are exposed for more than 24 hours. For that reason, Caco-2 P-gp expression and transport activity were evaluated only after 24 hours of incubation with colchicine. Exposure of these cells to Colchicine for 24 hours resulted in a small but significant increase in P-gp expression levels, although no significant changes were observed in P-gp transport activity. The observed results were important to characterize these cells in order to study the induction mechanism to protect cells from toxic compounds, including therapeutic drugs.

Acknowledgments:

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Hand grip strength in 11 to 15 years old Portuguese children.

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Introduction: The hand grip strength is an objective method to evaluate the upper members' integrity [1]. Since the muscle force is correlated, it is used as a general health indicator [2]. This method is simple, cheap, fast and, most important, reliable [2,3]. It is also used in childhood. The hand grip strength is generated mostly by type II muscle fibers, so it is related with anthropometric parameters such as weight and height and reflects the age dependent development of skeletal muscles [4]. Comparative data about grip strength values in healthy children offers the opportunity to research and diagnose diseases that interfere with grip force. The aim of this study was to determine average values of children hand grip strength by age (11- to 15- years old) and evaluate its relation with weight and height.

Material and Methods: The instrument used to measure hand grip strength was the Jamar Hydraulic Hand® dynamometer. The dynamometer was previously calibrated. Sample is made by 214 children of either gender, with ages between 11 and 15 years old. Weight and height were also measured. The measurements were made in a standardized position recommended by the American Society of Hand Therapy.

Results: Statistical significant differences were observed in hand grip strength between genders. Boys are, in all ages, stronger. Moderate correlations were found between grip strength and age ($R=0.727$, $p<0.001$), height ($R=0.741$, $p<0.001$), and weight ($R=0.656$, $p<0.001$).

Conclusion: The present study presents values of hand grip strength obtained from 214 Portuguese children of 11 to 15 years old of either gender. These data can be used as a comparative parameter in the evaluation of grip force of children of the same age. To the authors' knowledge, these are the first values of hand grip strength in Portuguese children.

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Project – “Colorful world of foods”

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According to WHO, overweight and obesity are one of the most serious public health problems of the 21st century in Europe. The obesity trend is especially alarming in children and adolescents. The prevalence of pediatric obesity is growing steadily in the United States and Europe as well as in developing and newly industrialised countries.

Recent studies have shown an increase in the prevalence of overweight and obesity in Portuguese children, showing that Portugal has the greatest prevalence of overweight and obese children (30,6 percent of boys and 21,6 percent of girls in both categories) among 11 years-old.

Childhood is a period of behaviours, attitudes and knowledge acquisition, being essential to influence will certainly last until adult life.

The main objectives of this project was to promote healthy food habits and to develop strategies to increase the consumption of fruit and vegetables among preschool children.

The project was developed on July 2009 preschool children from 5 to 6 years old at a kindergarten in a city on center of Portugal. The project started with an initial knowledge evaluation about healthy foods. It were developed different activities, such as anthropometric measurements, didactic games and cooking. It was made an evaluation of project results.

During four days of activities, all children participated actively and enthusiastically. At the end of the project all children experience vegetables, fruits and soup and the acceptability was considered good, even when a initial rejection of unknown foods was observed.

We may conclude that nutritional education strategies can be very effective in developing healthy eating habits, particularly in younger age groups, namely presenting new food products to children or at least new ways of cooking or serve them.



IJUP^{'10}
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Projects Fine Arts

Drawing and the Colonial War: a report from a distance

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I'm currently a student of the 2nd Cycle Course in Drawing and Printing Techniques at the School of Fine Arts (UP) and I'm applying for Project Presentation.

I'm developing a research project in the genre of report drawing. My field of interest is the biographic space related to a soldier that experienced and fought in the Colonial War in Mozambique. It is intended as a report, seen in the perspective of someone who hasn't been there, but who also experienced it from a distance, living it during the waiting hours.

Drawing is used as a method to construct a narrative and as a means to remake or re-present an event that happened in the seventies.

I will present a body of work made mostly of standard-sized cards that fit in an "airplane" type envelope. Other drawings will be presented also on paper, but in an superior scale (Fig.1), as well as some lithographic prints.

This is a work in progress.



Fig. 1

Comércio Santo

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Sinopse:

Numa época em que o indivíduo se parece diluir na multidão, onde a identidade não passa de um número e as vontades próprias são sonogadas por uma sociedade cada vez mais de controlo, vivemos o processo de crescente anestesia perante a vida. As sociedades contemporâneas promovem a liberdade ante uma congelação dissimulada do mundo; a sociedade acorrentada, que não exprime senão o seu desejo de dormir.

A sociedade tanto produz e administra a vida, como produz e administra os corpos. E ao fazer uma coisa e outra, ela faz bloco, cada vez mais, com a estética, com os sentidos, com as emoções, com a sensibilidade. A sociedade, que é um artefacto da razão, faz bloco com a emoção. Ela exprime, é verdade, a racionalidade contemporânea, a razão como controle da existência.

Comercio Santo, é uma fachada visual que utiliza os meios, técnicas e estética da sociedade actual, para criar subprodutos virtuais, montras ecrã, onde aquilo que se vende não é senão, a capacidade de relembrar a condição humana de individualidade.

Ficha Técnica: Desenho/Manuscritos s/papel,

Dimensões: Cartazes A3/A2

Local: a definir

Gyotaku; its origins and relationship to art and science

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First Year PhD Student.

Gyotaku is a Japanese printing technique used to produce credible images of aquatic lifeforms. Currently, I am developing an investigation which examines the historical and contemporary symbiosis of art and science embraced within this technique and its applications.

“Visual artists, especially in areas such as botanical illustration furthered science by making a new mode of visual communication possible. Artists developed this powerful new tool through their naturalistic 'pictorial statements' and even more important, they made visual statements repeatable and reproducible by the development of printmaking.” [1]

As an exploration into visual representations of nature and mimicry, seeing, knowing and representing I make particular reference to our understanding of beauty, aesthetics, mimetics and memes.[2] Utilising prevailing ideas and concepts within art and science and recognising the cultural impact which these have had upon this medium I am intending to trace the persistent currents in these intersecting perspectives. In unison practical experiments will be performed analysing the inks, papers, substrates and tools used for this technique, mapping the developments and effects upon the medium and the ways in which this is translated visually.



(Fig. 1) Detail of direct gyotaku print, Anjos, Skate/Airoga-*Raja batis*, 150 X 150 cm

I expect to provide the first extensive study of the gyotaku printing technique presenting a comprehensive review and validating its employment within science and art. By establishing the value of this technique and the images produced, both in terms of artistic expression and as contributions to scientific knowledge, my research will explain and prove the correlation between these fields and announce a consilience between the two disciplines.

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FAZER DO MEDO CHOCOLATE

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Da observação do real para a ficção, a narrativa que desenvolvo com o desenho, parte de uma organização taxonómica dos vários estados do papel que envolve o chocolate, desde o desembrulhar até ao alisar deste. Partindo do pressuposto que vou comendo a colecção de escaravelhos da Reitoria enquanto desenvolvo este estudo, a vontade de comer chocolate sobrepõe-se, e a organização inicial do desenho, que se prende com o modo de exposição que é próprio destas colecções, vai caminhando para o caos com papéis espalhados, assumindo diversas formas.

The contemporary. Drawing as an investigation field for artistic production - the insomnia.

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In focus is to understand the space of drawing, when and where new possibilities for this medium can be experimented and achieved.

This body of work, still being developed, finds in insomnia it's space/time as a possibility for a process where a methodology not totally controlled by decision after decision composes the drawn area by not changing a sleeping position when the insomnia arrives, meaning working with a muscular controlled action.

Using the same paper - normative DIN A4 – for all drawings and varying between several markers and muscular movements to produce the drawing, different geographies are obtained as a result of a muscular fatigue. Some stains show different muscle movements in order to obtain a more complex result (Fig.1).

Searching for new approaches on drawing production, understanding what some have spoken about what can, in a given image, in opposition to classical representation, emerge, instead the immediate, the recognizable.^[1]

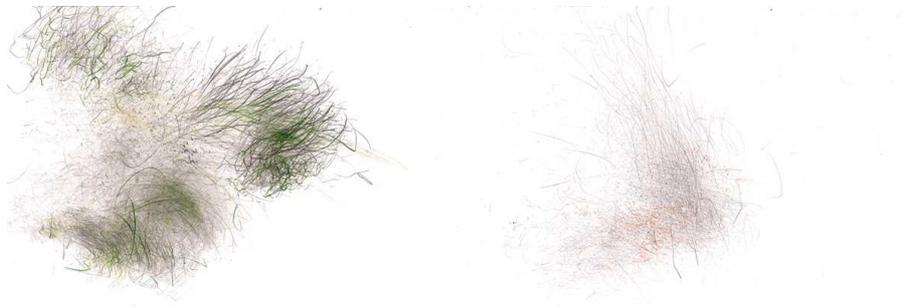


Fig. 1 (2 drawings, showing different markers and procedures).

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Chromatic Accords and Harmonic Chords Concept/Process/Object

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The learning and research of visual arts in general and of painting in particular are founded on a range of notions that is established on certain principles. The creative development of an artist certifies the understanding of these principles. In the present case, the research evolves from the symbiosis of theoretical musical paradigms to the benefit of the pictorial language.

Painting, the artistic praxis of this research, is grounded on three fundamental moments: the concept, the process and the resulting object. The three articulated elements are completely indissociable, defining the *act of painting* in its whole. The elemental object of research is the development of a consistently structured method that allows for the articulation of the above-mentioned moments. The production of a discourse based on the notion of space/composition, chromatism and support, as well as the final object, are organized in a coherent and rational progress.

In the process, the drawing consists simply of the articulation of parallelepiped structures intersecting in space according to a logic of simple progressions. The selection of a detail in that same drawing is transposed to the support. The composition/form thus assumes an objective rhythmic structure. The support where these disturbances are exposed entails, therefore, a controversial interpretation. The tri-dimensionality of the support is paradoxically related to the evoked bi-dimensionality of the composition.

The colour palette derives from an atonal harmony (1), establishing the correspondence of a colour to a musical note. Since the chromatic circle is equivalent to the circle of fifths (2), the title of the work is based on the predominance of notes (colours) as expressed in the universal abbreviation: C; D; E; F; G; A; B.

I regard painting not only as an object but as the process that precedes it. Music is a creative tool, a constructive element of thinking.

- (1) Modern system of musical composition based of the equal importance given to the 12 sounds of the chromatic scale.
- (2) The musical notes are organized according to fifth intervals.

ATELIER_PROJECTO

Eugénia Pequito¹

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O meu projecto artístico reflecte o percurso que tenho desenvolvido com base na interpretação biográfica dos espaços e objectos que foram propostos.



“Day after day” – scenes from my daily life moments

C. Marques¹

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This project comes from the theme “Drawing as Reportage” which has been developed in the course of Atelier of the Integrated Master in Drawings and Printing Technics taking place at the Faculty of Fine Arts of the University of Porto. Given several themes I chose “biographic space” as a start point for a series of quick “impressions” of some of my daily life living scenes.

As technic it was chosen a kind of Alberti Veil, made from a common canvas frame which I add a transparent thin plastic which allows to copy reality by the use of a more often black permanent marker. Then, more or less aleatory but personally stimulate scenes from my quotidian were chosen and framed in this clear “see through” canvas of 50x70cm which I can take everywhere.

As a result, the two combined, marker over plastic have made me develop an each time more free way of registering what I see. The hand slides through the visual camp as if I’m no longer concerned to understand what I’m seeing, and if what I’m seeing is correctly drawn, but what’s important now is to capture the moment as fast as possible and within very free but controlled gestures.

This is still a work in progress which should be finished until IJUP¹⁰. More drawings shall follow the ones presented in Fig.1 and the final goal is to create a printed series of one, several or an overlap series of drawings again like in Fig.1. The technique to be chosen will probably be silkscreen, mainly because of the characteristics of the drawing itself, very linear, and there will be tested monochromatic or polychromatic versions.



(Fig.1) Marques, Catarina 2010, Overlap of some Drawings already made (around 15), approximately 50x70cm

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Identities Metamorphosed

J. Paulino¹

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O projecto em desenvolvimento provém da problemática do Desenho Reportagem e tem vindo a ser desenvolvido no espaço de Atelier do Mestrado de Desenho e Técnicas de Impressão.

Debruçando-se sobre o espaço do Museu de Zoologia presente no edifício da Reitoria da U.Porto, e aproveitando toda a informação e disponibilidade a que este nos tem vindo a permitir acesso, pretendeu-se estudar a questão da máscara vs identidade.

O decurso do trabalho surgiu, desta forma, de um interesse crescente nas expressões dos animais expostos naquele espaço e do impulso de registo/planificação do focinho/expressão dos mesmos.

Tendo como ponto de partida imagens digitais de referência de construções faciais 2d (Fig.1) e, posteriormente, a imagem de um feto presente no Teatro Anatómico do ICBAS (Fig.2), estudou-se uma forma de obter este mesmo tipo de imagens mas, agora, a partir dos animais em exposição.

Concretizou-se, assim, o levantamento de algumas peças do museu através do desenho em película aderente que permitirá, posteriormente, e devido à falta de opacidade, a colocação/utilização/simulação como máscara (Fig.3). As máscaras, por sua vez, uma vez colocadas noutras superfícies metamorfoseiam-se em novas identidades descoladas das originais (Fig. 4).

A finalização deste projecto, de contornos ainda pouco definidos, passará por um trabalho resultante desta pesquisa e resultará na exposição de uma série de imagens impressas através de um processo serigráfico que impliquem algum tipo de interacção com o espectador/observador/visitante.



Fig.1



Fig.2



Fig. 3



Fig. 4

References:

[1] Dzama, M. *Welcome to Winnipeg*. Rizziero Arte, Pescara.

Desenho de Reportagem: Arquivo Morto

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O projecto que está a ser desenvolvido no Mestrado de Desenho e técnicas de impressão na disciplina de Atelier, tem como ponto de partida o estudo do Desenho de Reportagem baseado em três espaços distintos: o Museu de Zoologia António Nobre, o Teatro Anatómico do ICBAS e o Espaço Biográfico.

Debruçando-me sobre a ideia e o sentido de reportagem, tentei perceber de que modo o desenho pode acompanhar todo o processo de “relatar” um determinado acontecimento e desenvolvi o meu projecto pessoal, partindo de uma recolha organizada e de certa forma taxonómica dos aspectos que mais me chamaram a atenção nos três espaços. Depois de executar vários desenhos e de realizar uma vasta recolha fotográfica, acabei por me centrar na ideia de ilusão vs mentira que acabaria por guardar uma serie de aguarelas em fracos.

A transparência do acetato no qual foram posteriormente impressas as aguarelas, serviu de mote para a realização do trabalho e a sua utilização cria uma ilusão óptica bastante verosímil. O desenho e a mancha encenam toda esta ficção criada em volta dos frascos que parecem acolher peças do ICBAS.

Instruções de Reportagem

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O trabalho apresentado resulta do projecto de desenho de reportagem abarcado pela disciplina de Atelier/Oficina, do Mestrado em Desenho e Técnicas de Impressão da FBAUP.

O espaço representado em questão é o Museu de Zoologia Augusto Nobre, localizado no edifício onde está instalada a Reitoria da UP.

Este projecto consiste no levantamento de um conjunto de espécimes e espaços pertencentes ao museu, reportados de uma forma que se pretende aproximar do universo do modelismo de dioramas, kits e miniaturas, recorrendo a representações características desse imaginário, como a expressão gráfica e esquemática da ilustração/infografia das instruções de montagem.

«Destruindo taxonomias»

Miguel Moreira

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No âmbito da disciplina de Atelier/Oficinas do primeiro semestre do primeiro ano do Mestrado em Desenho e Técnicas de Impressão que frequento actualmente, foi proposto um projecto individual de trabalho teórico-prático assente na problemática do “Desenho enquanto Reportagem”. De entre um conjunto estrito de cenários físicos sobre os quais o trabalho se deveria desenvolver, tomou-se o Museu de Zoologia da Universidade do Porto como ponto de partida para este projecto.

Assim, depois de uma primeira fase de reconhecimento do espaço e de realização de vários desenhos preparatórios que são testemunho da face real do espaço, iniciou-se o projecto propriamente dito, a “reconstrução” desse mesmo espaço, a reinterpretação pessoal de objectos, factos, situações. Essa reinterpretação do espaço baseou-se na reformulação da forma de organização do espaço e na adopção de práticas heurísticas de representação do real, adquiridas no Mestrado, associadas ao trabalho autoral já em curso. Mais concretamente, pretendeu-se representar um grupo específico de animais – os insectos – de uma forma inovadora, de todo diferente da habitual distribuição segundo padrões taxonómicos. Essa nova forma de organização, aliada ao trabalho de ilustração e às noções teóricas apreendidas academicamente, assume um corpo prático num conjunto de desenhos de formato A3 e A2, nos quais se representam insectos distribuídos segundo uma estrutura inédita recorrendo a variadas técnicas. Um breve relatório serve de sustentação teórica dessa componente visual e um trabalho final de gravura a partir de um dos desenhos constitui uma amostra de uma possível edição por meio de uma das muitas técnicas de impressão desenvolvidas no decorrer do Mestrado.

Assembling new relations at canvas surface

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Currently developing my annual Project for the Discipline of Painting, degree in Painting, my investigation is centred on the potential of artistic practices that involve exploitation of the space at canvas surface.

Starting from the concepts of space, occupation and individualization, I search through abstract shapes to assemble new spaces. This search is achieved by establishing different relations among the shapes and between them and the limits of the canvas. I used individualized shapes, in variable number, that are systematically and instinctively added into the canvas surface (Fig 1). Some of the works are monochromatic, with shapes with colours like red and blue, while others have a few colours. I used different materials like oil, oil stick, acrylic and pigments. These materials are sometimes explored in the same surface that can be either canvas or paper. Shapes and sizes are variable and range from 80 cm to 200 cm. This project is still under development.



Fig 1. Red and white placed on grey, 2009
Oil, pigment and oil stick on canvas
100 cm x 140 cm



IJUP^{'10}
U. PORTO

Case Studies

IJUP

3: IJUP's 2010 Third Meeting of Young Researchers Poster

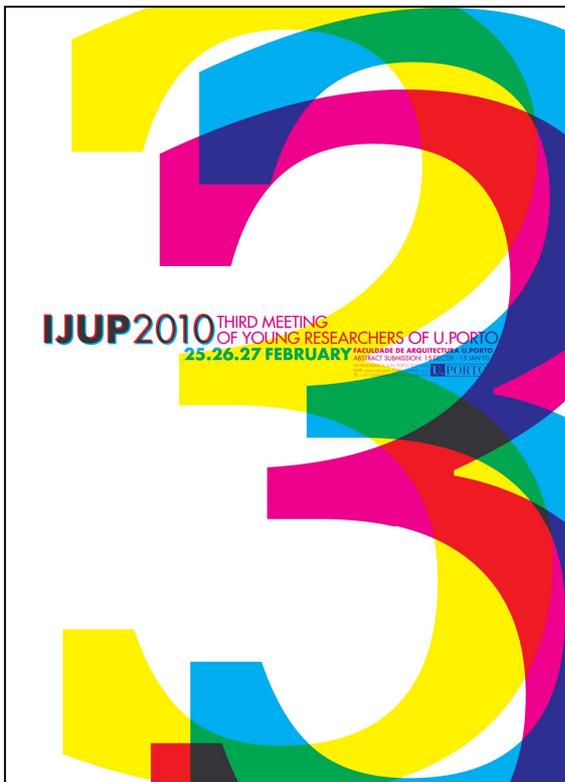
David Marreiros¹

¹ Faculty of Fine Arts, University of Porto, Portugal.

Developed on Design II class (3rd year of FBAUP's Communication Design Bachelor degree), the poster presented below (Fig.1) is one of the many others made by each student to promote IJUP 2010. To understand this work it's necessary to see it not only as a result itself but as a result of a process of research, conceptualization and execution.

Research and concept was always bounded together during the execution of this project mainly because of the nature of the IJUP's meeting. The concept of the poster consists in a relation between the actual meaning of the core words (meeting, youth and research) and colour theory based on subtractive colours.

In the subtractive process a full range of colours is created through mixing various colours where some wavelengths of light are absorbed while others get reflected. So, in the mixing, a colour begins with white and ends with black; it gets darker and tends to black when adding other colour to the first one. This is what happens with any kind of ink or paint; in general, with the printing process, where the CMYK colour system (Cyan+Magenta+Yellow+Key/Black) is the one used for printing. Black is just a key colour, the other three are the basic ones; the core of everything. So, any colour only appears through the meeting of colours, as well as research appears through the meeting of young students. So IJUP 2010 Third Meeting of Young Researchers is represented by the meeting of three colours (CMY). One colour alone is less than the junction of all three, where the possibilities increase and the results can be almost endless.



After concept is formulated it must take form. Constructed in a vector-based software, the execution of the poster was based on a relation between typography as text but also as image; one appealing to the informative side and the other to the visual impact: text readability and information hierarchy was treated to best communicate the message, and image consistence and colour coherence to best appeal to the viewer.

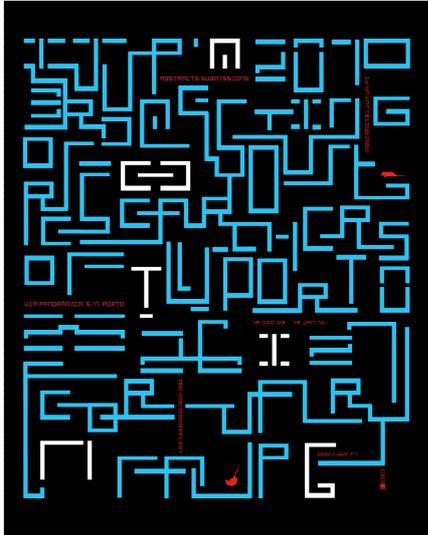
To summarize, the main aim was to construct a visually strong poster but even stronger conceptually. So, and in a more abstract way, it reflects the junction between the rational thought and the figurative one; science and art bounded together in one piece that is called University of Porto's IJUP 2010.

Fig. 1: Poster for IJUP 2010, 50x70cm, 2009

IJUP'S POSTER 2010

Marlene Couceiro

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O cartaz do IJUP 2010 é ele próprio o resultado de um processo de investigação, desenvolvido no âmbito da disciplina de Design III sob orientação do professor Rui Mendonça. Este cartaz nasce para anunciar a existência do acontecimento que é o terceiro encontro de jovens investigadores da Universidade do Porto e para motivar os alunos da UP do 1º ou 2º ciclo, para a inscrição e participação no encontro.

Primeiro é preciso encontrar, depois pode-se procurar. O conhecimento procurado é apenas uma consequência do que foi de início encontrado.

J. Gebser

O ponto de partida para desenvolver este projecto foi a necessidade de saber e pesquisar mais (investigar o que já foi feito, o que se pretende atingir, o público a que se destina, o conteúdo a transmitir). Para isso consultei o site do ijup, analisei as propostas de cartazes feitas nos anos anteriores e pesquisei cartazes para o mesmo tipo de eventos. Após a investigação de fontes, o próximo passo foi a planificação e organização do projecto individual.

Tendo como base o labirinto, enquanto espaço formado por um confuso conjunto de caminhos, que têm como objectivo dificultar ao máximo a saída, parti para o desenvolvimento do meu cartaz. Sendo o conceito de labirinto,

símbolo de procura, investigação e pesquisa o impulso para a produção do mesmo. Esta ideia de investigação é reforçada através do uso de dois ratos de laboratório, sendo o rato o animal preferido, para usar em testes médicos, pois a fisiologia é semelhante à fisiologia dos humanos e o seu período de gestação é muito curto.

O cartaz estava sujeito à crítica e às sugestões da turma, bem como do professor, os quais avaliavam e proponham algumas correcções, sempre que existia a possibilidade de executar melhorias, o que fez com que o cartaz fosse sofrendo algumas alterações ao longo das aulas.

A grelha que utilizei, para este cartaz, foi uma que me fornecesse apenas uma margem para separar o texto do limite e optei pela escolha de uma composição assimétrica.

No design gráfico a cor é fundamental, quando bem usada proporciona uma maior eficácia na comunicação visual e torna o cartaz mais atractivo. O meu cartaz é a cores, o que confere um maior realce à mensagem. As cores escolhidas foram o azul, a principal cor das qualidades intelectuais. A sua típica combinação é azul-branco. Estas são as principais cores da inteligência, sabedoria, da ciência e da concentração. Sempre que tenha de predominar a fria razão face à paixão, o azul é a cor principal. A cor branca também é aquela que está associada a tudo aquilo que está limpo e esterilizado. O preto é a cor mais objectiva e esteve associada a tecnologia durante bastante tempo, tudo o que aparecia como produto da técnica mais moderna era preto. Hoje o preto parece ser sinónimo de credibilidade e verdade. As minhas maiores preocupações na escolha das cores foi a sua relação com o tema e estabelecer uma ordem de leitura, é por isso que a cor é um dos elementos mais importantes no que diz respeito ao design, pois funciona como elemento orientador do olhar do utilizador. O designer tem pouco, ou nenhum, controlo sobre o local onde os cartazes irão aparecer e sobre o que os irá rodear. Por este motivo, o tamanho do texto deve ser legível a uma certa distância. Preocupe-me em assegurar a legibilidade da informação secundária, pois se o receptor não conseguir chegar facilmente a mensagem que o cartaz pretendia anunciar, através da mancha de texto principal, chegaria através da informação secundária, que apesar de legível, o tamanho das letras é pequeno, pelo que não desafia a tipografia principal, ficando antes modestamente arrumada no plano de fundo

Podemos fixar ou esquecer as imagens, mas captamo-las rapidamente! Neste cartaz eu pretendi o efeito contrário, um cartaz que não fosse demasiado directo, ou seja, pretendia que ele mesmo fosse um objecto de descodificação, em que a ideia, o evento só seriam captados após um exercício de análise, investigação do cartaz, dos grafismos do cartaz. O uso exclusivo de tipografia foi uma opção tomada tendo como objectivo proporcionar e fortalecer a curiosidade, codificar uma mensagem e estabelecer um paralelismo com o processo de investigação. Considero que o resultado final não é de fácil leitura, no entanto tendo em conta as características do evento que projecta e o seu público alvo, entendi que esse era um efeito que pretendia.

O designer é uma nova espécie de artista, um criador capaz de entender todas as formas de necessidades: não por ser um prodígio, mas porque sabe como abordar as necessidades dos homens de acordo com um método bem definido. **Gropius**

O trabalho do designer não diz apenas respeito à aparência superficial das coisas. Todo o design de comunicação exige uma procura de formas visuais para que possa transmitir mensagens e ideias. O resultado final dos designers não é fruto de um "dom natural" que nasce com ele, mas sim de um trabalho de investigação.

Criação da identidade do IJUP 2010

Raquel Koch

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Este projecto nasceu a partir de uma proposta da Reitoria da Universidade do Porto aos alunos da Licenciatura de Design de Comunicação da Faculdade de Belas-Artes, a qual solicitava a criação da identidade para o IJUP 2010.

A sigla IJUP corresponde a Investigação Jovem na U.Porto e identifica o projecto de estímulo à participação dos estudantes de graduação da U.Porto em actividades de investigação científica. Este programa tem como objectivos fomentar a participação dos estudantes da U.Porto em eventos de natureza científica, permitindo que os seus trabalhos sejam divulgados, e incentivar a discussão interdisciplinar entre as diferentes vertentes de investigação.

O cartaz foi o suporte escolhido para a realização da identidade por ser o símbolo gráfico mais visível e atractivo para o individuo. Segundo o designer e professor João Branco, “o cartaz tem dimensões características de exposição e uma postura similares às superfícies usadas para a pintura, apresentando-se como um espaço a que nós atribuímos um valor cultural superior”.^[1]

Como em qualquer projecto de investigação, independentemente da área científica, é necessária a realização de um pesquisa extensa sobre o problema. Foi, portanto, essencial definir o público-alvo e os temas, e investigar soluções anteriores apresentadas para o mesmo problema, neste caso, os cartazes das edições anteriores do IJUP e de outros programas semelhantes.

Assim, após a recolha de informação, procedeu-se à deliberação de um conceito, pois, como refere Jeffrey Zeldman, “o Conceito precede o Design. Design na ausência de um conceito não é design, é decoração.” A ideia final foi, então, a criação de uma ilustração abstracta que transmitisse o encontro das várias áreas científicas desenvolvidas na U. Porto, tais como, Biologia, Física, Química, Matemática, Ciências da Computação, etc.

O efeito de cada cor está determinado pelo seu contexto, pois este é o critério que determina se uma cor é agradável e adequada. A combinação de várias cores cria contrastes que ajudam, ou não, a transmitir a mensagem.. A escolha do preto como cor de fundo baseia-se nas sensações de elegância, objectividade e funcionalidade que esta cor transmite. Por outro lado, todas as cores parecem mais luminosas sobre um fundo preto. As outras cores utilizadas no cartaz, o laranja, o roxo e o magenta são cores que transmitem, respectivamente, energia e comunicação; “magia” e mistério; juventude e força. Assim, a ilustração criada, emprega não só a forma mas também a cor para comunicar os conceitos directamente relacionados com o evento.

Concluindo, e citando o designer Neville Brody, “a abordagem do design é a de um processo exploratório que nos leva onde quisermos para desenvolvermos constantemente soluções centradas num critério de revelação(...) ao nível da raiz da comunicação visual”.^[2]

References:

[1] Vitorino dos Santos, R. (2001), *Do Cartaz ao Cartaz Interactivo*, Porto.

[2] Fiell, C. and Fiell, P.(2005), *Graphic Design for the 21st century*, Colecção Icons, Taschen.

IJUP'S 2010 Poster

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O desafio que nos foi colocado foi desenhar a identidade do evento IJUP para um universo de pessoas inseridas na universidade do porto.

IJUP baseia-se num encontro de investigadores de áreas científicas diferentes de todas as faculdades da U.P, em que a principal preocupação é a apresentação pública de um trabalho de investigação, permitindo que estes sejam divulgados.

Para a realização da identidade foi-nos proposto efectuar um cartaz. A base de qualquer projecto assenta-se numa exaustiva investigação, neste caso não só a nível do evento e das soluções realizadas em anos anteriores mas também cartazes do mesmo meio. Segundo Manfred Triesch, “Cartaz é expressão de cultura. (...) Visível e inconfundível, como parte de um processo de comunicação(...) Bons cartazes falam uma linguagem internacional.”

Nessa perspectiva, surgiram vários conceitos básicos para a resolução do cartaz como: Investigação, comunicação, experimentação, tecnologia, etc.

Tendo em conta David Bernstein quando afirma que “o cartaz é para o olho aquilo que o grito é para o ouvido”[1], a ideia baseou-se na construção de um cartaz cuja leitura não fosse de rápida assimilação, de forma a transmitir a ideia de pesquisa e experimentação que o próprio evento requer, tentando que o receptor passe pelos mesmos percursos de investigação. Para isso, a tipografia seleccionada teria de ser totalmente legível de modo a poder ser alterada. A opção foi a Helvetica, uma fonte sem serifa bastante limpa e um dos princípios do seu projecto foi a máxima legibilidade, desenvolvida por Max Miedinger em 1957. A tipografia foi alterada a nível de forma e de escala, conjugada de forma dinâmica, usando formas sobrepostas por relações de transparências.

A escolha das cores azul e roxo está ligado á simbologia das mesmas: sabedoria, conhecimento e criatividade, pela sua ligação ao evento.

Desta forma, o cartaz finalizado é uma metáfora dos conceitos presentes neste encontro, tendo como objectivo despertar os mesmos no espectador.



Fig. 1- Cartaz realizado por Sónia Pestana

Referências:

- [1] Vitorino dos Santos, R. (2001), *Do Cartaz ao Cartaz Interactivo*, Porto.

IDENTIDADE IJUP 2010

Marta Nestor Pinheiro de Magalhães Pereira Rodrigues

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A designação “IJUP” (Investigação Jovem na U.Porto) foi escolhida para identificar o programa de estímulo à participação de estudantes de graduação da U.Porto em actividades de investigação científica. Inserido no âmbito do programa desenvolvi um projecto (cartaz).

“Durante a década passada, o enfoque do design tem-se concentrado em enfatizar a relação causal entre ideia e forma. Os alunos aprendem agora que aquilo em que se devem concentrar são as estratégias intelectuais, conceitos fortes e abordagens consistentes.”

O meu projecto teve como ponto de partida duas grandes influências. A primeira foi alguns exemplares de cartazes de Martin Woodtli. A ideia das riscas que se repetiam foi sem dúvida um dos pontos de partida. A outra influência foi a ideia da sobreposição de cartazes colocados na rua. Aspecto verificável na textura e na reciclagem de materiais.

O funcionamento do programa Photoshop foi transposto manualmente para o meu cartaz. A questão das layers e das transparências foi apropriada do programa. As layers estão recriadas na sobreposição das folhas e as transparências através da utilização de papel de engenharia sobre as composições. Assim sendo, onde a folha de engenharia surge recortada vê-se a opacidade total da “layer”. Utilizei três folhas com formatos A5, A4 e A3, sobre as quais criei uma textura com tiras de papel de revista. Quanto à tipografia optei por não recorrer a nenhuma font digital e recorrer a uma font manual mas com algum grau de rigor. Assim sendo, utilizei o escantilhão de letras de caixa alta e de caixa baixa para transferir a informação teórica necessária. Todos os componentes tipográficos foram colocados de forma directamente relacionada com a importância da informação a passar. Assim, surgem: a caixa alta e a caixa baixa, a leitura vertical e horizontal e os tipos a cheio e apenas a linha.

Em suma, o cartaz responde de forma objectiva à proposta inicial tanto em forma como em conteúdo. Todo o desenvolvimento do cartaz teve em consideração o ambiente do programa do IJUP sendo que passa a informação de forma eficaz e demonstra o carácter jovem do público alvo.

Referências:

- [1] Twemlow, Alice (2007), *Para que serve o Design Gráfico*, Gustavo Gili.
- [2] Woodtli, Martin (2001), *Woodtli*
- [3] Foster, John, *New Masters of Poster Design*, RockPort
- [4] Informação na Internet em Goggle Images, [www. woodt.li](http://www.woodt.li) e <http://pt.wikipedia.org>

Criação da identidade do IJUP 2010

R. Lago

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Este programa de estímulo à participação dos estudantes da U.Porto em actividades de investigação científica – IJUP, despertou especial interesse uma vez que no contexto da aula de Design II, nos foi proposta a concepção do cartaz de divulgação do evento. Embora haja a ideia preconcebida que o designer actua por intuição, sem um suporte teórico e de pesquisa por trás, com o qual fundamenta as suas opções, trata-se de uma oportunidade de poder dar a conhecer, neste caso específico, todo o processo de investigação e pesquisa implícito na concepção do cartaz.

O primeiro passo foi a pesquisa e análise do material já realizado no ano anterior (cartaz final, assim como propostas). Descodificação de conceitos, e opções utilizadas. Posteriormente defini que o elemento principal do cartaz seria ilustrativo, deixando a tipografia para segundo plano. O conceito que pretendi transmitir, foi o de encontro, que se traduz através de semicírculos, uma vez que esta forma traduz união, encontro. A partir desse elemento e utilizando apenas semicírculos, nasce o “3”, identificando assim que se trata do 3º encontro IJUP. Após o desenho feito e o seu enquadramento no poster definido, passei para a escolha de tipografia. Optei pela fonte “Abadi MT Condensed”, uma vez que transmite modernismo e interactividade, e por não ser serifada, causa impacto e é de fácil leitura. A sua colocação na composição teve como opção reforçar a linha de força vertical, onde se dá a união dos elementos geométricos. Assim não prejudica a força da imagem no cartaz. Por fim, a escolha das cores (amarelo, magenta e verde) teve que ver com as suas relações com os nossos sentimentos. Pois as suas associações não são meras questões de gosto, mas sim o resultado de experiências universais profundamente enraizadas na nossa linguagem e pensamento. O amarelo aliado ao magenta e verde, traduzem conhecimento, equilíbrio e atitude, que no fundo preto ganham ainda mais destaque.

Percorrendo este processo de investigação, a pesquisa aliada ao conhecimento e criatividade originaram o cartaz final.



Identidade IJUP'10

Lúcia Rocha

Licenciatura em Design de Comunicação 3º Ano

Em resposta ao lançamento da proposta para a identidade IJUP'10, fiz uma selecção de alguma informação, determinando que, o meu cartaz teria que transparecer a energia e o carácter de investigação de que vive o IJUP.

Comecei, então, por procurar autores, cujos trabalhos possuíssem alguma gestualidade, inspirando-me, por fim num autor colectivo contemporâneo, Concept 8, de Vienna. Este estúdio foi fundado em 1999 por Armin Hitzler e Christian Thomas. A sua ambição enquanto designers é o desenvolvimento estratégico da marca com base numa pesquisa e planeamento estruturados.

O meu trabalho caminhou no sentido de um grafismo expressivo que descreve a faixa etária a que o evento IJUP se destina. Na descoberta de uma espécie de desorganização que apela à investigação, procura da mensagem, desenvolvi o objecto de identidade com base na tipografia *28 Days Later*, um tipo de letra que reúne as características dos caracteres impressos manualmente. Este tipo de letra está inserido na categoria de fantasia e foi criado por Jeans R. Ziehn (nome artístico: Filmhimmel).

De forma a acentuar os conceitos pré-definidos e com base no autor escolhido, criei dois planos de leitura: o primeiro com um carácter mais interventivo e o segundo que permite uma melhor leitura das informações acerca do evento.

A utilização destas cores é propositada, na medida em que procurei, através dos símbolos a que estão associadas, encontrar as que melhor traduzissem os conceitos estipulados.

O amarelo é uma cor “intensa, violenta (...), a mais expansiva e ardente das cores (...) que submerge do negro”. Esta cor está também associada ao emissor de luz e vida, o Sol, à energia e sabedoria.

O preto, também intenso, remete para uma profundidade pacífica, para o desaparecimento das formas, visto que é ausência de luz.

O cartaz foi desenvolvido digital e manualmente. A atribuição de cor e a composição tipográfica foram elaboradas digitalmente e a parte interventiva foi feita manualmente. Por fim, todo o trabalho foi digitalizado e a respectiva imagem devidamente tratada (também digitalmente).

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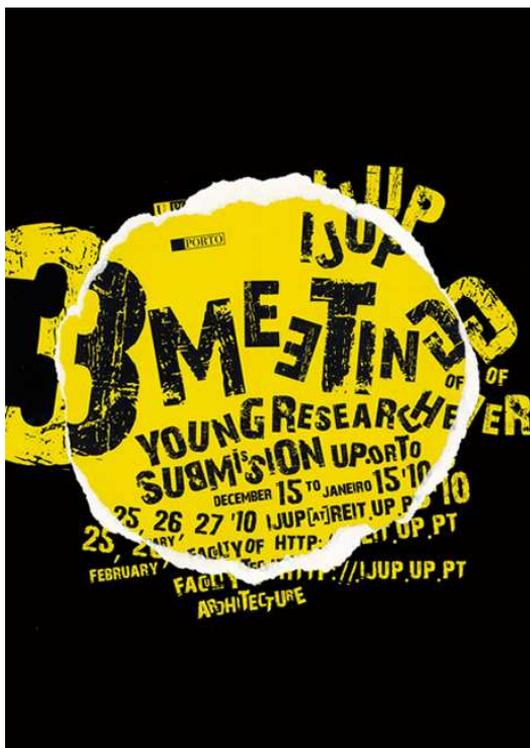


Fig. 1 Solução final

IJUP 2010

V. Marques

Faculdade de Belas-Artes, Universidade do Porto, Portugal

No âmbito da disciplina de Design, foi proposto aos alunos a participação na composição de um cartaz para a divulgação do evento IJUP. Este acontecimento pretende estimular a investigação dos alunos das várias faculdades da Universidade do Porto para, posteriormente, divulgarmos num encontro comum, os processos de investigação destas diferentes áreas. O meu projecto transpõe a necessidade de pesquisa que uma simples sopa de letras nos sugere, sendo uma metáfora aos diferentes patamares de pesquisa que temos de efectuar numa investigação científica.

O ambiente que o cartaz transmite é de indagação com cores não assumidas que transmitem dúvida e receio em assumir um caminho.

Como Manfred Triesch refletiu "Cartazes são mensageiros. Cartazes são expressão de cultura. Cartazes deixam marcas. Visíveis e inconfundíveis, como parte de um processo de comunicação, eles dependem do local e data de publicação. Bons cartazes falam uma linguagem internacional." Estes são os nossos objectivos a conquistar com a elaboração do cartaz.

D J S L Ç A N P H M D K S K W N W O C N V B K D J S L Ç A N P H M D K L Ç N P H M D K L Ç K
Q E B F V V J B B R J H F H T Y Y M V H N F T Q E B F V V J B B V J H F V J B B V J H F V T
T H Y I I I D U M E E T I N G U O F I W S H Y T H Y Q A D D U W O W O Q A D U W O W O Q A Y
H L B F V X C N O S Y I O P T H U M I U T Y L H L B F V X C N O R Y I F V C N O R Y I F V L
Q H J H K C B Y I E J F B V J B K N L H N R F O I J U P B Y Y I J J H E K Y Y I F J H K F
J K I O P H T E A A H C Z M B T S G S N V W H J K I O P T E E A B H C O P F C A B H C O P H
C Z U G H R T D R H D V S J R G H G Z G H V C Z U G H L T T G B H D G H T D Z B H D G H V
D J N V A D H U W C D W A H F H G S D J F H A D J N V A H U U D H D W V A U W W E D W V A A
D U D H F G H S N H V B J H K B L F O U Q R C D U D H F B F V W E V B H F F E N M V B H F G
D G Y I G B V R K E F O G D F Y H J I G C Z F E G U M G D E R N M F O I G E O K D F O I G F
F G K O F Y R P O R T O K S N S C H S G N T G F G K J H S V U K D Y I F V G D U F H D J H G
R W U W Q S U P B S S Ç D C K R F U F W T R F R W U W Q R E U U H D J H V D F B X S Ç W Q F
U E O Q E R U U Y T U E O Q P Y Q I G E H W U E O Q K Y R M S Ç W Q I P U Y T U E Q E W
N C R H G Y M F E N H R E H D J F F Q C H S C N C R H G D E L Y T J R H G E F E U J R H G C
J D B V V J L N D U J W S W O C W K J D O A E J D B V V D I F X U K W V V I N D D K W V V E
D V F H N O F H O D K Ç D C K V F A C U M Q W H J K I O V R E D D I T H N R M O R I T H N B
S G H D S G F I S I T U G H G W M X N L D A D I F H N O H O R S K D S O I S J S K D S G
E Y T U Y I H T J S J W P A T J W I D M B Y R S G H U Y U H F S J A D U Y H L S E A D U Y Q
E F I U R H O G U R U E T U Y I Q L I U T Y U E F I U R H O G U R O E R U G O R U E U R W
T D W S H S C G E T P I T R H J K A U G R Y I T D W S H S C G E T R Z S H C G E T R Z S H G
E R K J R E S U M O G U I R G Y T D S B J H T E R K J H G N F G Y G U J H N F G Y G U J H U
R D S K G N Y D R W T Y Q W E F H M E D S Y G R H Z M X N Y C R W T Y M X K O R W T Y M X E
N T R E S J D E V B N M X V C B N K F G Y D T N D S K G J J F V B N M R L H L V B N M K G A
E O E H I U Z F N V L G J S G W M X D I R U B O E H I U U T F N V Y I D E U T N V L H I U
N V S P H B D E F H S D K A M X D L G R Y U R N V R C H B W F P H C N V H Q T F T S D F H C
Ç P U F T G G M C N V B J F K J F U K S L D A Q P H F G X N Q C W K W F G C Y O C Q M B F G S
V B M A Q E B B S K W N V K D C B U K D M C B V B O A Q B T G S N P N A Q B I Q S K N A Q B
X M O U O R R R Y R C N W S D K A H U E O I M X M J U O M E B Y K G O R P O Y E T U O M
K D N C V H D O I M G F N E V N J G D F G R F K D A C V D E R L U S E C V U F V L S C C V F
D J S L Ç A N P O S C I S K W O C N V B D O J N L Ç J H U H B M D L Ç N P Ç K D K L Ç K
Q E B F V V J Ç H D H L F H T V I A V S E I K D D E F V D A N B Y V J F V J B V E M H F V T
T H Y Q A D Q B B O W O Q I E E R I I W S S Q T H I Q A H V J W O Ç W O A D Q B V W O Y A Y
H L B F V V D D P B H D V P T H J M U F H T L H L R M V L D D O R Y I I F O U W R Y I F V L
G H J H K X G Z N I R Y I V J K L M S T Y R F G D O I S D X G D E J F P H G N D F J H K F
J K I O P B E R U A F J F M B S D U L G H W H J K I L P T E E B H C O K E A E B H C O P H
C Z U G H R T Y P B H D V S J G H G E M A I L C Z U G H R T D Z B H D G H T D Z B H D G H V
D J N V A H U K A E D W A H F G S J Q Y R J A D J N V A H U K W E D W A U K W E D W V A A
D U D H F B V S N M V B J H K L F K G X Z U C D U D H F B V S N M V B H F V S N M V B H F G
D G Y I G Y R R O D F O G D F H J U J L C P F D G Y I G Y R R K D F O I G R K D F O I G F
F G K J H Z T I U S N C H S R E D S M E E T I N G G K J H S N D U F H D J H N D U F H D J H G
R W U W Q C F N C D K W O F G Y O U N G V B E J D B V V R U P B X S Ç W Q U P B X S Ç W Q F
U E O Q E U I F A R P R E S E A R C H I E S F R W U W Q Y M U Y T U E Q E R M U Y T U E Q E W
N C R H G Q P U I R O F S U P O R T O H F P W U E O Q E J L F E U J R H G L F E U J R H G C
J D B V V F D Q O H F W Q H O W K M C M A T C N C R H G C F N D D K W V V F N D D K W V V E
D V F H N O W W Q E V I N T R D A T E Y K B E J D B V V V E H O R I T H N E H O R I T H N B
S G H D S G F I S G I T O F S F F E B B I C O U B F H N I H W L J S K D S H W L J S K D S G
G W N A D W A J S D V F M V W M J G D H J V G S G H D S E F H I V G F A D F H I V G F A D S
D J N V A J J R C H L F I U S U B M I S S I O N D A T E U K W E D W V A U K W E D W V A A
C D D F A U N Q S V C B I J F D E G W O S N S R H F U W D W O F E T J V S N M V B H F C
D G Y I C A Y K R K E H T O Q I S A J A N N I O F O D G M R H J C B V R C A D K U F O I G F
F G K J H J H K L F K A D D R E S S C X F S N D U F Z U G D U D H H D J H N D U F H D J H G
R W U W Q C P B S Ç F A C U L D A D E C K F U I F X R P H E H U R D H W Q U P B O S Ç W Q F
U E O Q E T I U G D E A R Q U I T E C T U R A G K F H Y M Q Y M U E J E M U Y R U E Q E W
N C R H G Ç N V V I A U P A N O R A M I O A E F R W H W Q J L F U J R R G L F E T J R H G C
J D B V V I T E - M A I L U G H W U E O Q E G F B F F P C F N D D K W V V F N D O K W V V E
D V F H D U R E S U M O O I J U P U R P T A B D V K H N V E H O R I T H N E H O R I T H N B
S G H D S I H W L J S K S F J H K W M X N V G S G H D S I H W L J S K D S H W L J S K D S G
G W N A D E F H I V G F N V L G J I R P Q U S G W N A D E F H I V G F A D F H I V G F A D S
J K I O P T E Y A B H C Z M B S D U S G H W H J K I L P T E A E B H C O P F A E B H C O P H
C Z U G H R T Y P B H D V S J G H G E M A I L C Z U G H R T D Z B H D G H T D Z B H D G H V

IJUP'10

Diana Vila Pouca

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O processo de investigação é um sistema de aprendizagem tanto do indivíduo que a realiza como da sociedade na qual este se desenvolve e evolui. É, basicamente, um método de construção de novos saberes que tem como objectivo a criação de conhecimentos ou melhoramento de algum conhecimento já existente. A pesquisa e o trabalho de investigação regulam o conjunto de elementos que orientam a busca pelo conhecimento. A compilação do processo de investigação com o conhecimento caracteriza o evento IJUP (Investigação Jovem na U.Porto). Este evento surge recentemente em Portugal e dá a oportunidade aos alunos da U.Porto de divulgarem os seus trabalhos de investigação e estimularem a discussão interdisciplinar entre as diferentes vertentes de investigação que são desenvolvidas na Universidade do Porto.

Este evento surge também aliado ao âmbito da intervenção e da comunicação. “A comunicação é o suporte da vida em sociedade; nenhum grupo poderia sobreviver se não existisse uma troca de comunicações entre os seus elementos”, J.Martins Lampreia. A comunicação surge, também, aliada ao campo do conhecimento académico que estuda os processos de comunicação humana. Neste campo surge a proposta de concretização do cartaz para o evento. Todo o meio de comunicação do evento envolve uma investigação precisa e dedicada, de modo que o desenvolvimento da proposta transmita ao público uma mensagem clara e esclarecedora. “Vivemos a era de uma nova mitologia, cujo Deus supremo é o veículo: o meio que leva à massa uma cultura uniformizada, pré-fabricada, pronta para consumo imediato”, Charles R. Wright. Vista a importância da transmissão da mensagem foquei a minha investigação nos autores portugueses João Faria, Francisco Providencia e João Machado. Concluída a pesquisa comecei por fotografar um conjunto de folhas amarradas e estritas que referissem a ideia do processo de investigação.

Assim, com estas imagens comecei a construir as letras IJUP, com o objectivo de conseguir conquistar um impacto visual perante o receptor. As letras construídas manualmente, baseadas num projecto do autor João Faria, estão centradas no cartaz e no canto superior direito coloquei a restante informação necessária, de modo que esta deixasse respirar e não sobrevalorizasse a imagem principal. A palavra IJUP consegue assim transmitir a ideia de processo investigação, devido à força da imagem que utilizei. O cartaz foi essencialmente desenvolvido no programa Illustrator CS4 com base na imagem fotográfica da minha autoria.



Referências bibliográficas:

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Fig. 1 Solução final

Identidade e Cartaz para o evento IJUP 2010

Carolina Bagulho

Estudante da Licenciatura de Design de Comunicação na Faculdade de Belas Artes da U. Porto

O IJUP (Investigação Jovem da Universidade do Porto) é um evento organizado pela Universidade do Porto que consiste na apresentação de projectos de investigação de estudantes e docentes da U.P., e que conta também com a participação pontual de algumas universidades estrangeiras.

Uma vez que o objectivo do projecto de investigação foi conceber a identidade e o cartaz para o IJUP 2010, foi preciso, em primeiro lugar, iniciar um processo de investigação sobre o evento, sobre sua a imagem de anos anteriores e sobre uma série de autores que resolveram questões de identidade semelhantes, como por exemplo Paul Rand, ou Stefan Sagmeister.

A fase seguinte da investigação foi buscar e encontrar a imagem para a realização de um cartaz publicitário ao IJUP 2010. Para isso, foi necessário ter em conta o conceito, o objectivo e a essência do evento. Palavras-chave como partilha de informação, investigação, busca, processo, aprendizagem, resultado, discussão, diversidade, ciência ou ensino foram surgindo, e foi a partir dos seus significados que o projecto começou a ser desenvolvido.

Assim sendo, é de sublinhar que o trabalho parte de duas ideias formais essenciais: a primeira tem como base a tipografia, pretendendo-se que esta resultasse de uma procura, de um processo, até ter sido construída, uma vez que é formada por um conjunto de linhas que a delimitam, sendo que, no fundo, ela própria seria um resultado de uma investigação. A segunda é a cor: já que o IJUP integra diversas áreas de investigação, faculdades e até nacionalidades, o uso dos tons também foi diverso e, para além disso, têm uma conotação científica muito forte, uma vez que tem como base a teoria da cor e o espectro de Newton.

Deste modo, a imagem pretende não só ser um espelho do que é o IJUP 2010, como também ser sensível ao público a que se destina, apelativa e coerente com a identidade do evento.

Referencias:

Stefan Sagmeister

Paul Rand

Abraham Moles

Newton

IJUP 2010 - proposta de carta

Maria João Fraga

1 Design de Comunicação, Faculdade de Belas Artes, Universidade do Porto.

O IJUP é um evento de índole científica da Universidade do Porto, desenvolvido para fomentar a participação dos estudantes, e permitindo-lhes divulgar e apresentar os seus trabalhos de investigação. A discussão interdisciplinar é promovida neste encontro, onde as mais diferentes áreas do conhecimento, desde a Medicina às Belas Artes, são exploradas e relacionadas. O contacto com ideias novas provenientes de áreas tão díspares da ciência e do conhecimento é um factor essencial ao desenvolvimento das qualidades e características necessárias ao sucesso destes futuros investigadores.

É neste envolvimento que surge o presente trabalho - pela proposta da elaboração de um cartaz para o IJUP 2010, no âmbito da cadeira de Design II.

"Todas as verdades são simples de compreender quando são descobertas; a questão é descobri-las", Galileu Galilei.

Parti então para a pesquisa na área do design de cartaz, desde os designers mais antigos - João Machado, Sebastião Rodrigues, Paul Rand, Sauld Bass - aos mais contemporâneos - R2, João Faria, Stefan Sagmeister, Paula Sher, entre outros. E aprofundei a minha pesquisa no que diz respeito ao próprio evento e às diferentes áreas de conhecimento que ele abrange.

Cheguei à conclusão que este tipo de eventos serve, não só para promover a investigação científica, mas também os jovens estudantes da U.P. que a desenvolvem. Foi a partir desta ideia que o meu projecto se começou a desenhar. Já que este evento também propõe o desenvolvimento do estudante pelo seu carácter comunicativo e expressivo, a minha ideia foi apresentar o cartaz como a sua própria apresentação, ou seja, o cartaz é como que o produto de uma atitude de um estudante.

"Todos os projectos em que utilizo o meu corpo são para conferências ou exposições do meu trabalho, portanto, o uso do meu corpo é semelhante ao uso de uma simples imagem de um produto.", Stefan Sagmeister.

Então, o cartaz apresenta um estudante que apresenta o evento, como o seu próprio projecto. A fotografia foi conseguida utilizando o estúdio da faculdade e duas modelos.

Esta é fruto de um longo período de experimentação no que toca às suas propriedades lumínicas e cromáticas. Sendo que a ideia seria manter uma atitude informal, a luz e a cor não deveriam remeter para um estúdio; assim também aconteceu com a roupa que vestiam, que permitiu acentuar a sua atitude descontraída - própria dos jovens.

"A tipografia é o elemento híbrido da composição gráfica, que permite a comunicação, mantém viva a linguagem e faz com que o objecto final brilhe", Stefan Gandl.

Sendo que, como afirma Gandl a tipografia é essencial para a comunicação, neste projecto esta também teria de estar de acordo com o conceito que a fotografia já transmitia, e deveria ainda valorizá-la. Sendo assim, a tipografia teria de ter um carácter informal, talvez caligráfico, num campo mais próximo da ilustração.

Partindo para a pesquisa com autores como - Jean Julien, Pepa Prieto, Sara Fanelli, Oliver Jeffers, entre outros - comecei a esboçar e, concluí desenhando digitalmente (com Adobe Illustrator CS4). A tipografia que desenei reflecte manualidade, que se opõem às convenções tipográficas, e uma atitude informal, que vem de encontro também à fotografia e ao conceito essencial do projecto. Após a elaboração do cartaz e sua posterior melhoria, seguimos para o desenvolvimento do flyer, lona (para colocar na fachada da reitoria), convite e banner (para colocar nos diferentes sites da U.P.).

IJUP'S 2010 Poster

Pedro Lopes

Departamento de design, Faculdade de Belas Artes, Universidade do Porto, Portugal.

A proposta colocada foi de desenhar a identidade para o evento IJUP 2010, e para isso, foi nos proposto desenvolver uma proposta de cartaz para o evento.

Antes de começar a desenvolver o cartaz, foi preciso primeiro perceber o que era o IJUP: que assuntos são lá tratados, a quem se destina o evento, a sua história, etc; e também pesquisar sobre o cartaz: conhecer vários autores de cartaz, procurar cartazes sobre eventos do mesmo género do IJUP antigos e actuais, conhecer os cartazes anteriores do IJUP, pois

Inicialmente, escolhi desenvolver no meu cartaz a ideia de puzzle. Puzzle, porque puzzle é um jogo de dedicação, empenho, inteligência, um jogo onde se pode chegar ao fim de várias maneiras diferentes, tudo tal como a investigação. Fiz jogos de construção das letras “IJUP” com as peças, dei identidade a elas, trabalhei a tipografia como se estivessem inseridas em peças, mas nada funcionava. Ou não tinha identidade, ou era muito confuso, ou era muito impreciso. Ai, decidi romper com a ideia do puzzle, e trabalhar uma nova ideia, pois a dos puzzles não me estava a levar a lado nenhum. Segundo Francis Bacon, “Triste não é mudar de ideia. Triste é não ter ideia para mudar.”

Trabalhei a ideia nova, resultou, e deu origem ao meu cartaz final (fig.1). Nele coloquei uma silhueta de um homem a saudar, não com um chapéu, mas sim com um cérebro, como que se no IJUP saudassem as pessoas com “conhecimento”. Trabalhei o texto no interior da silhueta, e a tipografia utilizada foi a Helvética, uma tipografia sem-serifa, considerada como uma das mais populares ao redor do mundo. Coloquei um padrão de azulejos da cidade do porto para identificar o evento com a cidade onde se realiza, e a cor dominante no meu cartaz é o azul, porque o azul é a cor oficial das áreas de conhecimento.

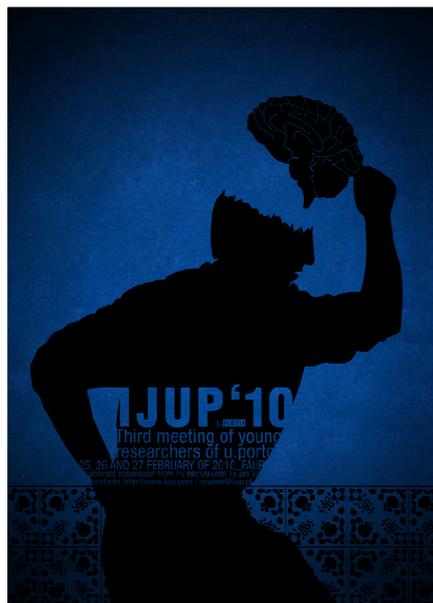


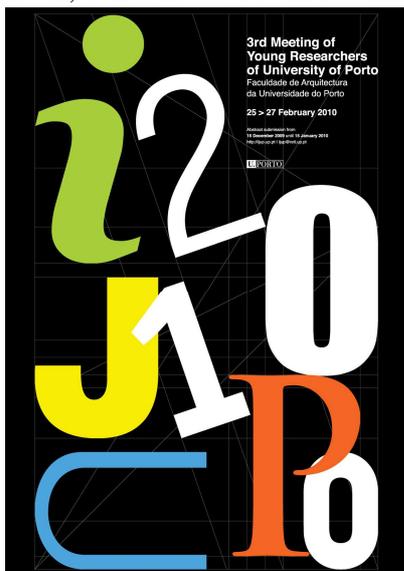
Fig. 1 – cartaz realizado por Pedro Lopes

Identidade IJUP'10

Pedro Reis

Faculdade de Belas Artes do Porto, Portugal.
Licenciatura em Design de Comunicação 3º Ano

O processo de investigação é um modo de aprendizagem, tanto da pessoa que a leva avante, como da sociedade na qual este se desenvolve e evolui. É, basicamente, uma forma de construir e adquirir conhecimentos que tem como objectivo a criação de novos conhecimentos ou melhoramento de conhecimentos já existentes. Os objectivos do IJUP são, essencialmente, o estímulo à participação dos estudantes da Universidade do Porto em eventos de carácter científico, de modo a permitir que os seus trabalhos sejam divulgados perante o resto da academia, e incentivar a discussão interdisciplinar entre as diferentes vertentes de investigação que são desenvolvidas na Universidade do Porto. Assim, em resposta ao lançamento da proposta para a identidade do IJUP 2010, procedi a uma recolha de informação, tendo em conta a minha intenção de induzir ao cartaz a ideia de força e vivacidade e, também, o carácter de investigação de que vive o IJUP. Este evento vive sobretudo das noções de intervenção e comunicação. Segundo J. Martins Lampreia “A comunicação é o suporte da vida em sociedade; nenhum grupo poderia sobreviver se não existisse uma troca de comunicações entre os seus elementos”. Neste campo da comunicação surge a proposta de concretização do cartaz para o evento. A minha ideia para a criação da identidade do IJUP foi imbuir-lhe um aspecto e espírito de investigação e de experimentação. Para tal, a pesquisa de autores que fiz baseou-se, principalmente, no trabalho do francês Philippe Apeloig, tendo em conta o carácter expressivo e dinâmico que este atribui à tipografia que usa. Desta forma, para transparecer a tal ideia de investigação e experimentação, usei como base do cartaz o rectângulo de ouro, de modo a “explicar” a localização e estruturação e o uso de todos os elementos empregados. O rectângulo de ouro é um objecto matemático muito interessante e de grande valor estético que existe para além do reino da matemática, nomeadamente na arte, na arquitectura e na natureza, sendo para mim um grande exemplo do rumo que a investigação e a experimentação podem levar, daí o facto de ter recorrido a ele. Relativamente à imagem “principal”, esta contém os



caracteres da sigla IJUP e os algarismos 2010. Para esta composição servi-me de várias fontes, entre elas a Georgia Italic, Helvetica Bold, Flama Light, Trajan Pro, Letter Gothic Std Bold, Impact Regular, Meta Bold e Bordeaux Heavy Regular. A composição criada a partir dos caracteres foi conseguida através do uso do rectângulo de ouro, como já foi referido, usando e criando novas linhas, de forma a tornar a composição dinâmica. Relativamente às cores utilizadas nas letras usei a cor de quatro das faculdade da Universidade do Porto, apenas para fazer referência à Universidade do Porto, e no fundo uma cor neutra, o preto.

(Fig.1) Pedro Reis 2009, cartaz para IJUP'10 - 3rd Meeting of Young Researchers of UP, 50x70cm

IJUP 2010 – Identidade e cartaz

Carolina Peres

Estudante de Design de Comunicação, Faculdade de Belas Artes da Universidade do Porto

“I love the big scale and immediate impact of posters. They’re my favorite things to design” - Paula Scher

No design gráfico, o cartaz é, provavelmente, a forma de comunicação “imperial”. A função que tomou ao longo do tempo fala por si. O poster é tão versátil como imediato, foi e continua a ser utilizado para propaganda, movimentos políticos e humanistas, para entretenimento, anúncios de concertos, espectáculos, e para efeitos meramente estéticos e figurativos. É com o cartaz que a informação e a comunicação se espalham mais rápida e facilmente e por isso, enquanto suporte orgânico, colocado preferencialmente em locais públicos, deve ser pensado de forma a captar a atenção das pessoas da forma mais eficaz. Há que ter noção que a comunicação tornou-se quase dependente da intervenção estética e gráfica e o papel do designer foi crescendo cada vez mais à medida que se exigia um maior rigor na divulgação de todo o tipo de eventos. De facto, o cartaz carrega consigo um enorme valor gráfico e estético.

Para este projecto em particular, desenvolvido no âmbito da disciplina de Design, leccionada pelo Professor Rui Mendonça, e tendo em conta o seu auxílio, o objectivo seria criar a identidade do evento anual IJUP 2010. A própria identidade partiria da criação do cartaz para a sua difusão.

Para a elaboração do cartaz ponderei certos aspectos que considereei oportunos. Inicialmente, comecei por perceber a intenção da divulgação desta entidade, para que tipo de receptores se destinava bem como a imagem que possuiu em edições anteriores. É realmente importante saber para quem se destina este evento e quais os objectivos a subsistir na sua divulgação.

Tendo em consideração que se trata de um evento destinado, na sua maior parte, à comunidade de educandos da Universidade do Porto, pensei em desenvolver um cartaz que para além de objectivo fosse expressivo e que, de certa forma, se conseguisse sobressair na comunidade da U.P. e até na cidade do Porto, que se distinguisse de forma a compactuar com essa comunidade.

Por conseguinte, acabei por executar um projecto mais plástico e complexo do que estava a contar. Idealizei uma composição em que a informação e a imagem se conjugassem numa só peça. Acabei por desenvolver um cartaz que tem como imagem uma ilustração em que texto e imagem se fundem. A tipografia está integrada nessa ilustração, construída manualmente, em que a própria é desenhada. A tipografia ganha a maior expressividade dentro da composição do meu cartaz uma vez que tive a preocupação de compor várias caligrafias distintas que funcionam em consonância. Na escolha das cores para o cartaz, tentei criar uma harmonia cromática em que a própria enfatizava a caligrafia. As cores ao juntarem-se acabaram por dar o aspecto fresco e expressivo que pretendia.

Identidade IJUP'10

Bruno Almeida

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Com o intuito de fomentar a participação de jovens estudantes da U.Porto em eventos de cariz científico, nasce o IJUP. Este programa de incentivo, apoio e divulgação por parte da Universidade do Porto visa motivar os alunos a uma maior discussão interdisciplinar entre as diferentes vertentes desenvolvidas no seio da U.Porto.

Desde os seus primórdios, quando registos gráficos foram encontrados em cavernas, que o Homem tem como preocupação o seu registo. Servindo-se de ossos, peles de animais ou madeira o Homem desenvolveu um sistema de escrita. Mais tarde, e num momento em que foi necessária a distinção entre a identidade e a autoria surge o signo como marca. *“paradigma histórico da identidade corporativa, embrião do que actualmente se designa por imagem global”* [01] Na sequência da proposta apresentada pela Universidade do Porto, a criação de uma identidade visual para o IJUP2010, surge o projecto ao qual me refiro.

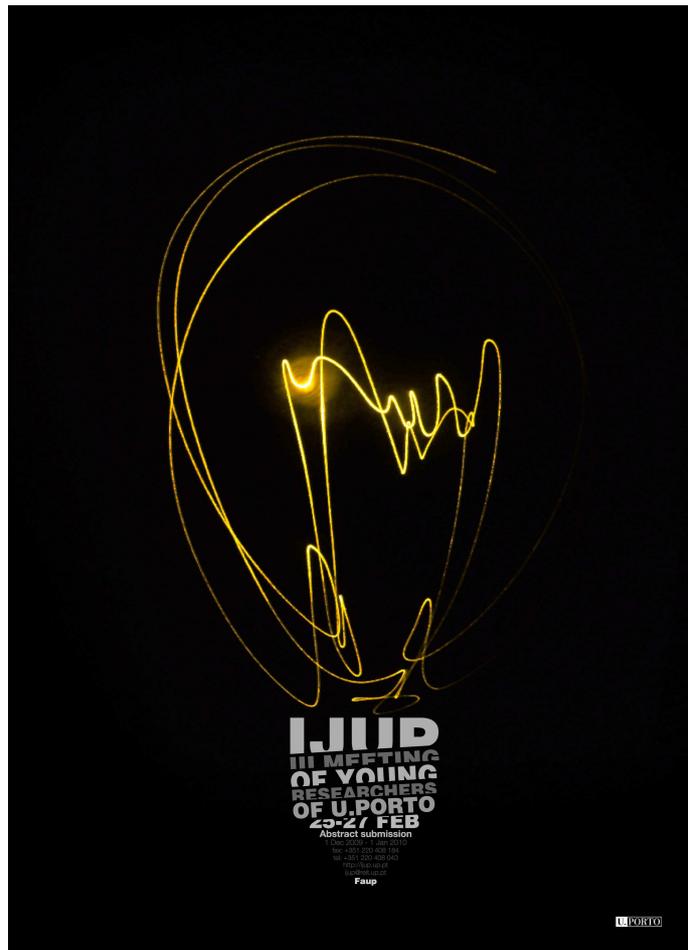
De entre várias ideias iniciais, optei por dar mais consistência ao projecto que apresento como final. Atendendo ao facto das marcas actuais se esforçarem cada vez mais de forma a criarem uma relação simbólica e emocional com o público, e considerando o IJUP um programa de incentivo a divulgação de novas ideias para público jovem, optei por criar um ambiente que explora-se o enigmático, a investigação, o “desenhar de uma ideia”.

Desta forma, baseado nos desenhos de luz de Pablo Picasso, e recorrendo a alguns conhecimentos no campo da fotografia, nomeadamente o tempo de exposição,

criei o desenho de uma lâmpada, objecto capaz de remeter o espectador para a noção de ideia, de um pesamento. Este ícone, aliado a expressão do próprio desenho teria como finalidade remeter o espectador para um ambiente semelhante ao que o IJUP pretende transmitir. Posteriormente, e como forma de integrar o texto e a imagem, procurei que este service como suporte da imagem, ao mesmo tempo, a sua disposição indicava a silhueta de um “caixilho”. Como tipografia utilizei a Helvetica. Desenvolvida por Max miedinger em 1957, Helvetica, é uma tipografia não serifada, limpa e bastante legível. Um pouco á semelhança do país de onde é proveniente, a Suíça, esta tipografia assume um carácter frio e rígido, capaz de se assemelhar ao caixilho de uma lâmpada, constituído essencialmente por materiais também eles rígidos.

Referências bibliográficas:

[01] COSTA, Joan - Imagen Corporativa en el siglo XXI, p.25



Ijup 2010 Cartaz e Identidade

Sílvia Silva

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Quando se fala de investigação sobre a comunicação visual, abrange-se um campo muito vasto que vai desde a fotografia, ao desenho, das imagens imóveis às imagens movimentadas, às imagens elementares, às imagens complexas, ao limite de legibilidade, às emoções, ao indivíduo...

O cartaz como elemento da nossa cultura e realidade urbana surge como forma de comunicação que procura eficácia na mensagem. Deste modo o seu papel é educar, informar e apelar, e para isto deve seguir determinados aspectos como contacto directo, síntese, contraste, legibilidade, ligação imagem texto, medida...

Este projecto foi produzido na aula de design da Fbaup, leccionada pelo professor Rui Mendonça, e consistiu na criação de um cartaz de anúncio do IJUP 10.

Neste cartaz optei por fazer da tipografia a própria imagem, e foi através da fluidez e subtileza desta que procurei seduzir o público a que é destinado. Para a produção deste projecto, e tendo em conta aquilo que pretendia desenvolver, procedi a uma investigação profunda em relação ao trabalho de alguns designers que conseguem somente através do uso de tipografia chegar a soluções sensacionais. Neste processo de investigação procurei designers com estilos e características diversas, para que pudesse absorver as diferentes tendências de cada um, e chegar a uma solução eficaz, notável e consistente. E foi através da fluidez e originalidade de Alex Trochut, a expressividade de Stefan Sagmeister, da delicadeza e subtileza de Si Scott, da extravagância e dinamismo de Katemorrross, que o meu projecto seguiu este rumo.

Achei fundamental enveredar num grau de simplicidade e delicadeza de maneira a estimular os estudantes da Universidade do Porto a participar nesta actividade de investigação científica. A cor que utilizei no cartaz surgiu de forma a auxiliar e facilitar a apreensão das formas e conteúdos deste. A cor surge para atribuir à forma uma representação mais profunda e central.

A conjugação da harmonia, do equilíbrio, da síntese, da dinâmica, da linguagem gráfica utilizada no cartaz, pareceu-me ser uma boa forma de anunciar o Encontro de conhecimentos das diferentes vertentes de investigação de toda a Universidade do Porto – IJUP.

Proposta de Poster para o evento IJUP 2010

Filipa Almeida

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“What do a red light and a poster have in common? Stopping power. As soon as the traffic lights turn red, all wheeled road users jam on the brakes. A good poster leads to a similar reaction. The difference is that a red light forces you to stop, but a poster seduces.” ... “So first attention, then interest, and then – a few seconds later – information transfer. Designers have learned how to work with letters, legibility, order and so forth to facilitate that transfer of information.” ... “Originality of concept and style is what it is truly about.”

Jelle van der Toorn Vrijthoff

A arte do poster consiste em captar a atenção do espectador. Um bom poster deve destacar-se no meio de outros, já que, nos dias de hoje, há uma grande competição na tentativa de prender o público. Quando o designer pensa um poster, deve ter em conta o público-alvo que quer prender. Neste caso, considerando que o IJUP é um evento sobre investigação jovem, este deve ter o poder de transmitir isso e apelar ao evento em si.

Para a minha proposta, tentei criar um poster que se destacasse, recorrendo ao uso de uma tipografia de carácter bastante forte, utilizando uma fonte slab serif criada por Hoefler e Frere-Jones, a Ziggurat. A cor foi acrescentada através do uso de imagens de texturas, numa tentativa ilustrar as várias areas de investigação.

Assim, fundindo o texto “IJUP 2010” com a imagem, construíu-se uma só peça, em que o contraste da fonte bold com as texturas é muito grande, não apenas pelas cor, mas também pelo carácter das próprias peças. As texturas estão apresentadas em formas de bolhas, e como são variadas obtemos imensas cores, o que dá um aspecto dinâmico e apelativo ao cartaz.



IJUP'10 Identity Project

A. Areias

¹ Department of Fine Arts from the University of Porto

First of all, the beginning of a design project must be initiated with advanced research about the theme of the work, minding either the customer's needs and background and the kind of graphic and intellectual approaches that already have been done concerning the same objectives.

With that in mind, I've found Ijup to be a happening that intends to ignite youngsters to present their projects starting from the idea that the processual basis for any area of study is always initiated by research.

With the information well organised, the design process has begun to happen by the means of associating ideas conducted through a mindmap of word related to research; from which the main concepts arose: Searching, Experimentation, Innovation, Researching, Hypothesis, Knowledge and Technology.

Based on this synthesis methodology, it has been engaged the process of production of the poster.

It has been chosen a typographic approach in order to provide and empower curiosity, codify a message, and thus establish a bridge between process and the investigator's will to learn. The use of the typeface Didot, Adrain Frutiger's approach to the original by Firmin Didot, combined with Helvetica, created by Max Miedinger, represents the duality of the event: New approaches to the research fields that are still able to be serious and institutional. The choice for the main concept of the poster, to be the branding of "3rd meeting of young researchers of UP" and not "IJUP" was made to attribute relevance to a message that is far more descriptive and less speculative, and to create a graphic bond that related the numeral of the poster to the mathematic realm of statistic and analysis.

The choice of the color spectrum was defined to use only bright cold colors, with the abundance of a reddish violet tone, being this gamma described by Eva Heller as being the least seen color in nature, and therefore, related to the concept of laboratorial exploration, cold as the unknown and the notion of universe, which was the theme chosen for the composition, once that it is highly vibrant and appealing.

The elements were composed starting from fragments that totalize a form, just like particle systems throughout the cosmos, that are constantly grouping and ceasing. The typography itself is created using overlapped shapes allied by transparency relations, in the same amount of visual impact as the blades, fluids and corants used in microscopes.

These synthetic and detailed approach is eager to please and ignite the dedicated researching process of the scientific exploration.

Post-it

Filipa Martins

Departamento de Design, Faculdade de Belas Artes da Universidade do Porto

O evento IJUP (Investigação Jovem na U. Porto) destina-se promover a investigação científica entre os jovens. É um encontro anual no qual todos os jovens da U.Porto podem participar com um projecto de carácter científico devidamente justificado. O objectivo do IJUP é também ajudar para que haja uma interdisciplinaridade entre as diferentes áreas de estudo dos diferentes cursos da UP.

Aos estudantes de Design de Comunicação Gráfica como eu, foi nos pedido que realizássemos o cartaz de promoção a todo este evento.

O cartaz que eu produzi teve como bases a ideia de pesquisa, tomada de notas e formação de um conceito. Para fundamentar estes itens recorri á ideia de “post-it” que são simples papéis coloridos onde se podem escrever breves notas e que normalmente todas as pessoas utilizam a quando do seu estudo ou investigação.

A esta ideia da utilização de post-it adicionei também a ideia de construção através da sobreposição dos post-it. Esta ideia de construção deriva do facto de que para se chegar a uma solução tem que se fazer obrigatoriamente um encadeamento de ideias.



Mechanical IJUP

Bárbara Coelho

Faculty of Fine Arts, University of Porto, Portugal.

O IJUP tem como intuito, fornecer aos estudantes a oportunidade de exporem os seus trabalhos de investigação e incentivar a discussão interdisciplinar entre as suas diferentes vertentes, que são desenvolvidas na U. Porto.

Neste âmbito, o objectivo do meu trabalho centrou-se no desenho de identidade do IJUP10', respondendo à necessidade de comunicar a mensagem do evento ao seu público-alvo. “Tudo o que vemos nos comunica alguma coisa. Cores, formas, texturas. Um enorme e complexo universo de pequenos detalhes se combinam para nos trazer informações processadas instantaneamente pelos nossos cérebros. E tratando-se de comunicação, somos cada vez mais uma civilização visual”[1].

Uma identidade visual é sempre marcada pelo estudo que antecede a sua construção, desta feita, a minha metodologia baseou-se na procura de um simbolismo que pudesse transportar o espectador para a finalidade do IJUP. De facto, o objecto que despoletou toda a estruturação do trabalho foi a roldana e o sistema em que se insere, que por sua vez se move graças a leis físicas simbolicamente análogas a um processo de investigação extenso. A ilustração nasce assim de um objecto particularmente complexo que através da sua forma configura a palavra “ijup”.

A tipografia apresentada é Impact, caracterizada como forte, dura e rígida, incentivando a segurança e resistência a quem a lê. O seu alinhamento à esquerda deve-se à valorização da imagem, ou seja, o recorte vertical esquerdo na composição tipográfica, vem enaltecer a forma arredondada e poética da ilustração. Este tipo de representação é fundamental no trabalho de Isidro Ferrer, onde a tipografia não compete com a imagem, graças à delimitação da primeira e resultante expressão da última.

A composição final resultou numa assimetria visual, ou seja o cartaz tornou-se equilibrado mesmo com a variação das posições dos elementos, dando lugar a formas inquietantes em vez de passivas e desinteressantes.



[1] STRUNK, Gilberto. *Identidade Visual, a direção do olhar*. Rio de Janeiro: Europa, 1989.

IJUP 10 poster: “This is not just a beautiful typography”

Tiago Campeã

IJUP 10 poster is a project that intended to spread the event of U.Porto, through Graphic Design, having as the main goal, to reflect the image the event wants to have among the students of this university, in a way to increasingly become more captivating to these.

As a young researcher, my methodology of research to this project was based in eight steps:

First: I started to search previous researches about this specific matter. Then, looked to my personal experience and thought how could I come with a new perspective of the same research question. Having found the two keywords "Research" and "Youth", I collected some meanings like: Search/ Explanation/ Not-obvious/ Procedure steps/ Levels of interpretation/ Nuclear point.

Second: With these, I defined my statement of research question: *"This is not just a beautiful typography."* I intended to show the main audience that Graphic Design is not about having hability nor skills, but that what is behind every single visual aspect has a reason.

Third: To design my research methodology, I synthesized the concept of bringing all research areas to the poster, using just their extremes: scientific reason - emotional expression.

Fourth: I identified some readership that could help me to defend my statement.

«The purpose of graphic design is to get people to action or inform them. If part of this paper is to create a friendly social environment, the better.»

Milton Glaser

The purpose of graphic design is “to put a pad under the leg of a wooden table.”

Andy Altmann

Fifth: As this project was about an event of multiple areas of research, from science to arts, I tried to pick some iconic procedures of those and, with them, build a unique piece, that would not get away from the original idea.

Sixth: I searched for some biological procedures of dissection to understand how layers of skin and bones really work together.

Seventh: I used the same procedure in a typographic work (tools of poetry) to show that every single layer means every single step you accumulate to your research, when collecting data to increase the statement of a research question. I analysed kernings, leadings, optical compositions, color perceptions, before I come up with an appealing and balanced result.

Eighth: Through this methodology I concluded my poster in a clean, synthesized and detailed work, only visible when closed to the poster, which makes the audience look and understand it in two levels of interpretation.

Finally, I could show that the poster of the research event is itself a research, "photographed" during the process, a work in progress.

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