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29th May - 1st June 2012, Lisbon, Portugal

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PROCEEDINGS BOOK

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FOREWORD

The Scientific Area of Environmental Health of Lisbon College of Health Technology, in conjunction with the National Environmental Health Association, the Departments of Environmental Health of the Health College of Beja, Coimbra and Porto will hold, with the high patronage of His Excellency, the President of the Republic of Portugal, the International Congress on Environmental Health, Know(ing) the Environment to Protect Human Health (ICEH 2012). The event runs concurrently with the 20 year commemoration of Environmental Health Course, of Lisbon College of Health Technology, and will take place in Lisbon, between the 29th of May and the 1st of June of 2012 in the College auditorium.

ICEH 2012 will present the most recent scientific and technological developments in the field of environmental health, emphasizing in individual disciplines, namely Air Pollution, Environmental Toxicology, Food Safety, Indoor Air, Occupational Health and Public Health.

The meeting aims to bring together researchers from a number of different countries and continents, involved in these issues.

Therefore, the Organizing Committee is pleased to announce an exciting innovative congress, with scientific presentations covering a wide range of topics.

We look forward to your presence and participation.

Lisbon, 29 of May 2012

The Organizing Committee

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Com o alto Patrocínio de Sua Excelência O Presidente da República

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Marta Almeida, Technical Higher Institute/Nuclear and Technological Institute

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Environmental Chemical risk assessment: contribution of occupational health

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The Exposome

Paolo Vineis, School of Public Health – Imperial College London

Abstracts

Plenary Sessions

Environmental chemical risk assessment: contribution of occupational health

M. Manno

University of Naples Federico II, Italy

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Concern on the potential health effects of human exposure to chemicals in the environment is increasing rapidly throughout the world. This is not surprising as chemical exposure is probably the single largest challenge to human health today. Huge expectations were raised by the tremendous advances made during the "genomics' revolution" in recent years, as to the possibility of discovering the causes/contributory causes of many chronic human diseases including cancer. These expectations, however, have been disappointed and it is now becoming clear that the role of exposure to chemicals and other environmental factors largely overwhelms that of genetics. Unfortunately, as it was brilliantly depicted by Chris Wild a few years ago, the resources allocated to search the causes of chronic diseases recall a fiddler crab, whose huge claw represents the efforts put into genetic research, whereas the other, much smaller claw, represents the relatively small investment allocated to environmental research. Chemical risk assessment remains, therefore, a major challenge for our and future generations. Having said that no attempt will be made here to present or discuss the various procedures currently adopted, in Europe or elsewhere, to protect human health through environmental chemical risk assessment (ECRA), nor to consider in any detail the main current issues or areas of concern in ECRA. This very conference is aimed to cover them adequately. The purpose of the present keynote is just to highlight one aspect, the one which has probably contributed most to our current understanding of the mechanism whereby environmental chemicals may interact with biological targets to damage human health: occupational exposure. Many regulatory agencies are rightly concerned with the eccessive use of animals for chemical testing and are trying to limit them. We should remember though, since the pioneering insight of Bernardino Ramazzini, that the party who had paid, at least in the past, the greatest cost to the improvement of *ante litteram* ECRA are the workers themselves.

Survey on chemical contaminants in baby foods

P. Alvito

Food and Nutrition Department, National Health Institute Doutor Ricardo Jorge (INSA), Lisbon, Portugal and Adaptation Biology & Ecological Processes, Centre for Environment and Marine Studies (CESAM, FCUL, Lisbon).

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Foodborne diseases are defined as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. The adverse health effects of foodborne diseases range from mild gastroenteritis (including diarrhea and vomiting) to life-threatening neurological, renal or hepatic syndromes, congenital anomalies and cancer. The risks posed by the presence of microorganisms and chemicals in the food supply are of concern worldwide, especially for children.

Children have unique exposure pathways. They can be exposed in utero to toxic environmental agents that cross the placenta. Such exposures can be biological (viral, bacterial, parasitic) or chemical (pesticides, toxins). They can also be exposed to pollutants that pass into their mother's milk. Neither of these routes of exposure occurs in adults or older children. Children also have pathways of exposure that differ from those of adults due to their size and developmental stage. The amount of food that children consume per kilogram of body weight is higher than that of the adult because children not only need to maintain homeostasis, as adults do, but are growing. In addition, children consume different types of food. The diet of many newborn babies is exclusively breast milk. The diet of children usually contains more milk products and certain fruits and vegetables than the typical adult diet.

The strict regulations and measures applied in European countries mean that food is generally safe, but ingestion of contaminated food may still present an important route of exposure to chemical hazards. Industrially produced food is an important part of the diet for many infants and toddlers in developed countries. Baby foods have special functions to play in the diets of infants because they are major source of nutrients and a unique source of food during the first months of their life.

In order to contribute to assess the risk to children´s health arising from the presence of hazardous chemicals in food, a recent survey study on food contaminants in baby foods marketed in Lisbon, was conducted by the Food and Nutrition Department, INSA, during 2007-2008. These are the first results reported in Portugal on the occurrence and exposure assessment of mycotoxins (patulin, aflatoxins and ochratoxin A), nitrates and heavy metals (cadmium) detected in baby foods. Further studies on the interactive cyto and genotoxic effects of mixtures of mycotoxins detected in baby foods will also be presented in this conference.

Microbes: eat them, or let them eat us?

L. Brito

CBAA/ DRAT- Instituto Superior de Agronomia, Technical University of Lisbon

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Microbes have developed intriguing strategies of survival that allowed them to persist, in most extreme environments. The food borne intracellular pathogen *Listeria monocytogenes* has become a model for the study of host-pathogen interactions, and bacterial adaptation to abiotic environments. Although it is accepted the wide distribution of L. monocytogenes, it would appear that some clones, including epidemic clones, became endemic as a result of an adaptation to specific ecological niches. The more we understand these recalcitrant living creatures, the more we will succeed in survive them.

Plenary Sessions

Indoor Air Quality Certification in Portuguese Buildings

S.M. Almeida*[1], M. Almeida-Silva[1], M. Pinto[2], D. Rodrigues[2]

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The residential and tertiary sector accounts for more than 40% of the final energy consumption in the European Community and is expanding, a trend which is bound to increase its energy consumption and hence its carbon dioxide emissions.

This fact explain the priority that the EU has for reducing the energy consumption in the building sector, both for advancing in the compliance of international agreements, as well as for reducing its energy dependency, and therefore for leading its development path towards sustainability. The objective of the Directive 2002/91/CE is to promote the improvement of the energy performance of buildings within the Community. This directive regards the energy certification that must provide a clear and detailed information about the building's energy performance (energy labeling), allowing for the straight comparison between different buildings.

This emphasis on energy conservation can result in tighter buildings with recirculated air for building ventilation and minimum amounts of fresh air being brought into buildings. However, little or inadequate fresh air ventilation, originates an indoor environment with relatively high levels of chemical and microbiological contaminants. The larger concentration of indoor air pollutants, combined with the fact that most people spend 85 to 90% of their time indoors, make them susceptible to illnesses related to these airborne contaminants.

Plenary Sessions

In Portugal, a step forward was given when the European Directive 2002/91/CE was transposed to the Portuguese law because it included IAQ requirements such as comfort parameters, concentrations limits for indoor pollutants and minimum levels of air renovations in the energy certification mechanisms. Therefore, since 2009 a significant fraction of the Portuguese buildings are obliged to make the control of their indoor chemical and biological pollutants in order to obtain a certificate. Until December 2010, 1073 existing buildings were certified. The main certified typologies were offices (572), supermarkets (156), banks (72), hotels (63) and shopping centers (44).

The objective of this work is to evaluate the IAQ in the 1073 certified buildings, identifying the main air quality problems and associated sources. This work will identify the main strengths, weaknesses, opportunities and needs of the IAQ certification in Portugal.

Seasonal Variability of Atmospheric dust over Cape Verde Islands

C.A. Pio*[1]; M. Almeida-Silva[2]; J. Cardoso[1,3]; T. Nunes[1]; S.M. Almeida[2]; M.C. Freitas[2]; O. Tchepel[1]; F. Rocha[1]; M. Cerqueira[1]; J. Ferreira[1]; D. Terroso[1]; D. Jorge[1]

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Aeolian dust is a common atmospheric contaminant, as result of the action of atmospheric turbulence on uncovered soil surfaces. Dust emission into the atmosphere is highly dependent from wind speed and soil disaggregation and dryness. Atmospheric dust may have important impacts on environment and climate. Dust can intervene in the thermal equilibrium of the atmosphere either directly through dispersion of radiation, or indirectly by interference in cloud formation and precipitation. Deposition of dust on marine surface has been related with inflow of mineral nutrients (such as iron) and the overall bio-fertility of the oceans. Although less studied and illustrated dust episodes may have significant influence in human health in areas subjected to dust plumes; recently, spells of uncommon illnesses have been attributed to long range transport of microbes from Asia continent through the Pacific Ocean into Japan and western USA.

Plenary Sessions

Although important quantities of dust are present in most atmospheres during dry periods, principally in Summer, in areas such as the south of Europe, the largely predominant sources of dust to the atmosphere are the desert areas of the world, in Australia, eastern Asia and principally in African Sahara. Every year millions of tons of Saharan dust are introduced in the atmosphere and transported to long distances over the Mediterranean and Europe and principally into the North Atlantic Ocean. Satellite observation have indicated clearly the importance of this input into earth hemispheric and atmospheric dynamics, but satellite data needs to be calibrated and complemented with in loco observations to precisely quantify and understand dust emission, transport and deposition processes.

The Project CVDUST, started in 2009, aims at contributing to increasing our understanding of Saharan dust impact on Atlantic marine environment by performing a set of measurements in the Cape Verde Island of Santiago. Cape Verde archipelago is located offshore of Western Africa coast, directly into the route of Saharan dust transport to the Atlantic, being an optimum place to observe and study the African aeolian aerosol. Furthermore the study permits to evaluate the possible impact of dust episodes on the health of Cape Verde population.

Biological Monitoring for occupational and environmental risk assessment

J. Cocker

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Biological monitoring is a tool to help assess occupational and environmental exposure to hazardous substances. On the spectrum from initial exposure to disease biological monitoring can be used to assess systemic exposure and the effect or the consequences of exposure. By measuring the substance or its metabolites in biological samples, usually urine or blood, biological monitoring can assess exposure by inhalation, ingestion and through the skin.

Biological monitoring has been used for many years to assess occupational exposure and there are several sources of guidance values to direct the collection of samples, their analysis and to help interpret the results. There is now a growing awareness of the utility of biological monitoring for assessing environmental exposures. As occupational exposure limits are reduced they are coming closer to levels found in the environment.

This presentation will give two examples of biological monitoring first used to assess occupational exposure and also available to assess environmental exposure. Polyaromatic hydrocarbons are formed from incomplete combustion of organic material. Many are carcinogenic and thousands of workrs may be exposed in industries ranging from coke and steel manufacture to fish smoking. Measuring 1-hydroxypyrene in urine samples is a simple way to assess exposure and can be used by regulators and employers to target activities to reduce exposure. This metabolite can also be found in samples from people exposed through their diet and environment.

Another example is the measurement of the dialkyl phosphate metabolites of organophosphate pesticides in urine. Levels found from occupational exposures can be compared to those found in volunteer studies, environmental and medical exposures.

Plenary Sessions

Biomonitoring in Occupational Settings

J. P. Teixeira

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One of goals of Environmental Health is to prevent disease and injuries caused by chemical pollutants present in the environment. The main objective is to keep chemical exposure to an acceptable level that does not imply in risk. In order to accomplish that, it is necessary to identify and quantify chemical risk through biological assessment of human exposure-Biomonitoring. Human biomonitoring of dose and biochemical effect nowadays has tremendous utility providing an efficient and cost effective means of measuring human exposure to chemical substances. Human biomonitoring considers all routes of uptake and all sources which are relevant making it an ideal instrument for risk assessment and risk management. Human biomonitoring can identify new chemical exposures, trends and changes in exposure, establish distribution of exposure among the general population, identify vulnerable groups and populations with higher exposures. Blood and urine are by far the most approved matrices. Biomonitoring can be done for most chemical substances which are in the focus of the worldwide discussion of environmental medicine. This especially applies for metals, PAH, phthalates, dioxins, pesticides, as well as for aromatic amines, perfluorinated chemicals, environmental tobacco smoke and volatile organic compounds. We will present concepts and principles covering the utilization of biological indicators/biomarkers in order to evaluate exposure to chemicals and risk to human health. The use of biomarkers with different purposes may be classified in to three types: of exposure (internal dose), of effect and of susceptibility, which are means for identifying toxic substances or hazardous conditions before damage to health has occurred.

Plenary Sessions

Intregation of omics into Longitudinal Epidemiological Studies

P. Vineis

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The measurement of biomarkers is becoming essential to assess the role of environmental exposures in human disease. Although methods such as GIS (georeferencing) and questionnaires have become more accurate, individual exposure assessment based on biomarker measurements tends to be at least complementary to them, e.g. by providing a quantitative assessment of exposure. Identification of such molecular entities is now eased by the recent developments in omics technologies, which introduced a wealth of potentially exciting intermediate biomarkers. Biomarker validation is crucial and relies on the identification of the hazardous component and the investigation and assessment of the potential underlying biological/biochemical process. Once biomarkers are validated, they ought to be incorporated in the exposure assessment to complement traditional approaches (e.g., GIS and questionnaire data) as well as in the continuum between exposure and disease. Progress toward the achievement of any of the above steps is facilitated by the additional development of appropriate study designs. The application (and refinement) of appropriate study designs together with the development of dedicated analytical strategies constitute an important component of future research, which would provide new insight into exposure and disease pathophysiology, based on already existing samples available in biobanks. Though the use of biomarkers (particularly omics) in longitudinal epidemiological studies can be very rewarding, it is clear that the field is still in its infancy. The challenges we face are unknown reliability and accuracy of marker measurements; lack of repeat samples in presence of potentially large intraindividual variability; large amounts of biological samples needed; only vague knowledge of time relationships between exposure, intermediate biomarkers (endophenotype) and disease onset; incomplete understanding of mechanisms of carcinogenesis; and incomplete mathematical modeling. However, from such challenges, extremely interesting results may emerge.

Plenary Sessions

Perspectives to the European Sources of Environmental Burden of Disease

O.O. Hänninen[1] and the EBoDE Working Group

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Health impacts of environmental stressors range from mild psychological effects (e.g. noise annoyance), to effects on morbidity (such as asthma or cardiovascular disease caused by exposure to air pollution), to increased mortality (such as lung cancer provoked by radon exposure). As demonstrated by these examples, health effects of environmental factors vary considerably with regard to their severity and duration. Nevertheless, however difficult quantitative comparisons across a range of stressors may be, it is needed for setting priorities in health policies and environmental health research.

The EBoDE project was set up in order to update the previous assessments, to add stressors relevant to the European region, to provide harmonized EBD assessments for participating countries, and to develop and make available the methodology and databases for other countries (Hänninen & Knol, 2011, WHO, 2010). The specific objectives are to provide: (i) harmonized estimates of burden of disease for factors relevant in European countries; (ii) maximize comparability of over countries and stressors; (iii) provide qualitative assessment of variation and uncertainties.

Plenary Sessions

The results suggest that more than 3-7% of the discounted and age-weighted burden of disease in the participating countries may be associated with environmental stressors. As an example, Finland had the smallest EBD but suffered from the largest overall burden of disease.

Air pollutants had a significant role. Particulate matter (PM) is estimated to be the leading factor associated with 6.000 to 10.000 DALYs per million people, followed by noise, second-hand smoke and radon (with overlapping estimate ranges from 600 to 1500 DALY per million and their order varying by countries) (Figure 1).

Some of the EBD estimates contain substantial uncertainties that could be only partly quantified. However, quantification of selected uncertainties and comparison of the results with independent earlier assessments indicate that the overall range of the estimates from 2 to 10 000 DALYs per million annually is relatively robust. Some of the stressor estimates are overlapping, in which case the ranking of them is very uncertain; this applies especially to the three runner-up stressors noise, SHS and radon. Estimates for dioxins contain the largest uncertainties.

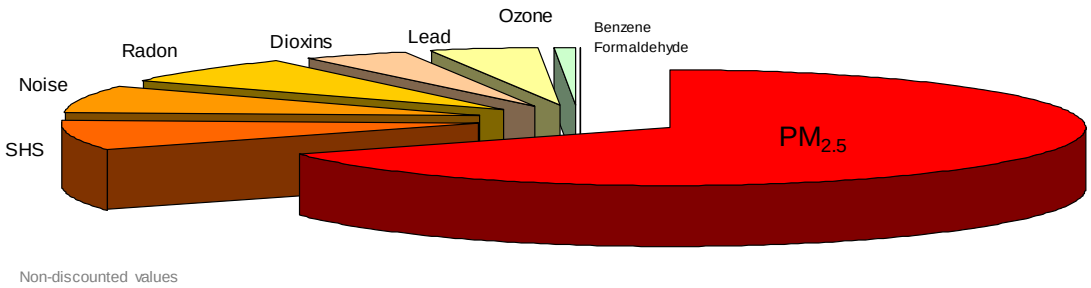

Figure 1. Relative contribution of the nine targeted stressors to the burden of disease (undiscounted, un-age-weighted DALYs) attributed to these stressors, average over the six participating countries.

The EBoDE results highlight the fact that environmental burden of disease plays a role also in the developed countries in Europe. Second hand smoke exposures are currently the only stressor that is effectively tackled by the EU policies. Benzene, lead and dioxin exposures have also been effectively controlled. However, traffic noise is increasing and radon and PM2.5 levels are more or less stable. European policies are needed for developing effective controls for these exposures and their effects on health.

The Fukushima Nuclear Accident and Environmental and Human Health Impacts

F.P. Carvalho

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The earthquake with a magnitude of 9.0 occurred in the Pacific off northeastern Japan on March 11, 2011 caused a devastating tsunami and ultimately the nuclear accident at Fukushima Daichi. The cooling equipment for the reactors was lost because of damage by the earthquake. The resulting hydrogen explosion caused the collapse of outer walls of reactor buildings for units 1, 2, and 3, and release of nuclear materials. The majority of the airborne fission product releases occurred over March 2011. High volatility fission products including 129mTe, 131I, 134Cs, 136Cs, and 137Cs were discharged into the environment, initially into the atmosphere and later brought to the ground by wet and dry depositions. Later, during the action to control the nuclear accident, large amounts of radioactive water were discharged into the coastal sea as well. Radioactive iodine, strontium, and cesium present a large risk for internal radiation exposure via inhalation and ingestion of contaminated agricultural crops and seafood. Radioactive depositions severely contaminated the neighbor areas in Japan and an emergency response was undertaken to contain the immediate and direct radiological exposure of the population. Radioactive discharges into the atmosphere and the ocean contaminated the environment and food chains, thus compromising the use of local food resources. Furthermore, radionuclides were dispersed by environmental processes and, for example, transported by atmospheric circulation around the globe undergoing extreme dilution but still able to reach Portugal and Europe. An assessment of the environmental radioactive contamination and of radiological risk for the population is presented.

Plenary Sessions

Parallel Sessions

Hydrogen sulphide emission control with Fe-EDTA/Fiban catalyst

H. Wasag

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Hydrogen sulphide is a part of well known environmental problem. It can be found in natural gases and it is also produced by different human industrial activities such as natural gas extraction and processing, chemical industries, skin processing, municipal engineering, cattle farms. Hydrogen sulphide causes an irritating, rotten egg smell and it can be detected by human in concentrations as low as 0.2 ppb. Concentrations until 30 ppm result in strong odour, but higher concentrations affect the nervous and respiratory system of human and hydrogen sulphide can no longer be smelled. Emission control of hydrogen sulphide is required for reasons of health, odour problems, safety and corrosivity problems. The means of removing of hydrogen sulphide mainly depend on its concentration and kind of purified medium. When hydrogen sulphide concentration is very low, techniques such as thermal and catalytic combustion, oxidative scrubbing and biofiltration might be preferable to attain deodorization. However, combustion converts sulphur into SO_2, while oxidative scrubbing gives rise to sulphate containing solutions. In the present paper removal of low concentration of hydrogen sulphide by its selective catalytic oxidation with Fe(III)-EDTA catalyst carried on fibrous ion exchangers has been described. The complex of trivalent iron converts hydrogen sulphide to elemental sulphur. Bivalent iron formed in the reaction is oxidized by the atmospheric oxygen, so complex of trivalent iron is continuously regenerated and the overall process can be accounted as pseudo-catalytic. Iron(III) chelates are well known and widely applied catalysts in many methods of hydrogen sulphide abatement. The main disadvantage of the methods is the fact that the catalyst is active only in strong alkali environment which causes serious operational problems. The problems could be solved with help of Fiban fibrous ion exchangers as carriers of the catalyst. The base of these materials is fibrous ion exchanger with Fe(III)-EDTA complex immobilized on their functional groups. The role of fibrous package is improving the mass-transfer between the gas and liquid, buffering the pH of absorbing solution and, probably, catalyzing the reactions of oxidation of sulphur and iron ions. It was proved that the filtering layers with anion exchange package are much more active in the catalytic processes of hydrogen sulphide removal than cation exchanger and inert materials. In the addition to the nature of the fibre–solution carrier the process of catalytic oxidation depends on concentration of hydrogen sulphide in the air, relative air humidity, the process time and the content of Fe-EDTA complex in the fibres. Among them relative humidity of the purified air seems to be a critical factor determining efficiency of the material in the air purification from H_2S. It was shown that the efficiency of the ion exchanger as a gas absorber was controlled (alongside with the other factors) by the amount of “free” water, not bound in strong hydrates and thus able to dissolve the gaseous component.

It has been established that application of the Fe(III)-EDTA/Fiban catalytic system, under appropriate conditions, leaded to nearly complete conversion of H_2S to elemental sulphur.

Air Polution

Volatile substances in printing as pollutants of working and living environment

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Among the chemicals used in the printing process dominate easily volatile compounds (VOC) that have a very detrimental impact on the health of workers, and through the formation of photochemical smog they pollute the environment. Volatile organic compounds make up 98 to 99% of all toxicants in the printing industry. This group includes means for printing form preparation, inks, means for wetting and cleaning and other substances. The aim is to sample and analyze substances that appear in the printing process and to determine their impact on the workplace and the environment. Since different printing techniques emit different types and concentrations of pollutants, it is necessary to examine where in the work process these concentrations exceed the levels that could adversely affect the working environment and then environment in general. On the basis of numerous experimental data, depending on the printing technique and the level of printing equipment and methods for maintaining the equipment, it is estimated what workplaces and positions are most exposed to these toxicants. In accordance with the assumptions, offset printing proved to be a weak emitter of pollution with volatile substances. The exception is the process of washing a printing machine based on ethyl acetate when values significantly above the limit are measured in the vicinity of the machine. On the other hand, the process of screen printing is a constant source of volatile compounds that are accumulated throughout the production facility. The effect is particularly evident in small printing workshops with inadequate microclimate conditions. Especially drastic examples of exceeding boundary values are observed in facilities with the intaglio printing process, which despite very adverse effects on employees' health and the environment still persists in less developed countries. Based on data obtained in measuring in workshops with different types of printing, various production capacities, and different state and maintenance of equipment, the paper presents economically and environmentally acceptable solutions to reduce the concentration of harmful volatile substances to a satisfactory level regarding safety and health in accordance with European standards.

Air Polution

Key words: volatile compounds, safety and health at work, printing techniques, air pollution

n-Hexane removal using a dielectric barrier discharge plasma

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This research was carried out to determine the removal characteristics of n-Hexane using a dielectric barrier discharge (DBD) plasma technology. Influential factors were retention time, initial concentration, power, relative humidity and background gases. When 50 ppm of n-Hexane was irradiated for 3 sec under 70 W, approximately 97% removal efficiency was achieved, but it was completely decomposed with respect to over 3 sec of retention time in the reactor,. Moreover, the decomposition efficiencies of n-Hexane were observed to rise when the initial concentration was lower, and moisture content and inlet power were higher. The removal efficiency of n-Hexane, when air was used as background gas, was higher than that in the case that He or N2 were used as background gases. Dry and wet conditions were compared, where the control efficiencies increased by 12.5% when gas-phase moisture was supplied. A small amount of hydrocarbons, alcohols, aldehydes and ketones were produced as by-products.

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Using surface discharge nonthermal plasmas in continuous reactor for eliminating VOCs in air stream: Influence of some operating conditions and identification of byproducts

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VOCs are hazardous compounds to health and environment. Their emission in the atmosphere will cause serious environmental problems. So legislation requiring stringent enforcement of new regulations having the goal to improve the quality of environment is defined. To remove those toxic gases, many technologies have been developed. One of the promising processes for the control of VOCs emissions is the Surface Discharge Plasma.

This study presents some experimental data of conversion of five pollutants such as isovaleric acid, isovaleraldehyde, trimethylamine, ammonia and hydrogen sulfide using nonthermal plasma technology. The influence of many experimental parameters such as residence time, humidity and input energy has been investigated. The evolution of by-products formation is also followed.

The DBD plasma pilot used is principally a glass tube (58 mm id and 100 cm length). To generate the DBD (Dielectric barrier discharge) plasma, the reactor is covered by a copper plate which constitutes the outside electrode. The inner discharge electrode is made of aluminum. The dielectric media, the glass reactor wall, is 4 mm thickness. The high voltage applied is a sine waveform. The air flow rate to be treated varies from 2 to 10 Nm3/h.

When the input energy is increased from 6 to 17 kJ/m^3, the removal efficiency isovaleraldehyde is multiplied by two. This effect is observed regardless of the input concentration. On the other hand, when the input concentration increases the removal efficiency decreases. For example when input concentration is equal to 200 mg/m^3, it is about 23% but when the concentration is equal to 75 mg/m^3 it was nearly 75 % for an input energy equal to 17 kJ/m^3. Moreover, this effect exists for different experimental conditions and with the other pollutants. The study of the effect of the residence time shows that the removal efficiency decreases with this parameter.

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The formation of by-products due to isovaleraldehyde, trimethylamine, isovaleric acid elimination is also studied. The by-products have been identified and analyzed are classified into three groups: intermediary products, carbon oxides (CO_2 and CO) and ozone. Moreover the by-products due to ammonia and hydrogen sulfide are respectively NO_x and SO_x. Concerning the organic components, an increasing of input plasma energy leads to a higher mineralization of the pollutant i.e. less intermediary products and more carbon dioxide. The mass-balance on carbon products is satisfied at about 99%.

The ozone formation increases for increased input energy. It is interesting to note that when the pollutant inlet concentration increases the ozone formation decreases at a given input energy

Impacts of Road Traffic Emissions on Ambient Air Quality from an industrialized area

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Several epidemiological studies have been showed a strong correlation between high levels of road traffic emissions and incidence of cancer and cardiovascular and respiratory diseases in the populations exposed to this pollutant. For this reason, the European Directive 2008/50/EC, on ambient air quality and cleaner air for Europe, reinforces the need and obligation of Member-States to monitor the average exposure level of their populations to the APM and to adopt measures to reduce these levels.

However, in order to plan effective, efficient and appropriate measures to attain a significant reduction in the pollutants concentration of in the ambient air, it is necessary to have a deeper knowledge on the various sources and of on their contributions to the formation of the ambient aerosol (considering both the temporal and spatial distributions).

The aim of this study was to quantify the relative contribution of road traffic to ambient air in an industrial area which also encloses harbour activities. This work focuses on road traffic emissions, which is one of the most APM major anthropogenic emission sources, especially for finer particles.

Special emphasis was given to the contribution of vehicles exhaust versus dust ressuspension by traffic. The traffic emissions were estimated by applying the computational modeling tool TAPM - The Air Pollution Model using the following inputs: 1) a traffic study performed in the studied area (hourly count of vehicles broken down by class); 2) emission factors for the vehicles emissions (according to the registration year and class) and; 3) emission factors for ressuspension of particulate matter which have been deposited on the roads pavement. Modeled pollutant concentrations were validated by values obtained by an air quality monitoring station held by an industry located in the area under study.

Results showed that the highest contribution of traffic resulted from dust ressuspension and not from vehicles exhausted. The heavy vehicles was the class that most contributed to the PM10, NOx and HC concentration whereas the highest emissions of CO provided from the cars classes.

Exposure to air pollution and subjective fatigue among traffic policemen in Tehran, IRAN

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The objective of this study is to examine if exposure to urban air pollutants is related to fatigue sensation.

A cross-sectional study was performed on 250 traffic policemen, who were randomly selected from 15 districts of Tehran. Fatigue was measured by means of The Multidimensional Fatigue Inventory (MFI) questionnaire at the end of shift (i.e. about 14h). Air pollution data were obtained from the Iranian Environmental Protection Agency and contained information on all of the routine air pollution monitoring. Linear regression analyses were performed with five levels of fatigue as dependent variables and air pollutants as independent variables.

The results indicated that all of the five scale of fatigue (General, Physical and Mental Fatigue, Reduced Activity and Reduced Motivation) increase linearly with Nitrogen Dioxides (ppb) concentration ($p<0.05$). Concerning Particulate Matter (PM10, ppm), this relation was observed for general, mental and reduced motivation scales. No significant association was found between exposure to other air pollutants and fatigue sensation.

Our study provides good evidence confirming that exposure to some components of air pollution, in particular NO2 and PM10, clearly increases subjective fatigue. The authorities should adopt and rigorously implement environmental protection policies in order to control air pollution

Air Polution

Environmental Impact Assessment of Schools as Typical Detour Destinations in Coimbra Municipality

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Mobility it's a crucial factor in human civilization, promoting its development, the establishment of partnerships as well as the exchange of goods and services. Although, the line of global development verified in the past decades, has boosted a bigger worldwide car park, raising serious issues, and a pressing demand for adequate answers. The personal vehicle, until recently seen has a key factor in the mobility of populations presents nowadays, problems precisely on those who depend on it. These issues include the number of accidents, the escalation of respiratory diseases, due to its emissions, or an overpowering contribute in worldwide energy consumption and in the quantity of greenhouse gases emissions to the atmosphere. Therefore it urges to study the environmental impact that the tours and detours to typical destinations, in this case the schools, present. And how the most insignificant changes in a tour with detours has repercussions in global and particular terms, at a daily, monthly and during the period of a school year levels, environmentally and financially in those who make this detours. The studied results show us the existence of significance levels in the impact of these detours and also an important association between gender and the predisposition to adopt or not, an environmentally friendly means of transportation.

Air Polution

Biomonitoring with *Tradescantia pallida* used as complementary tool to the surveillance program in environmental health-related air quality in area with biomass burning at Brazil.

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In Mirassol D'Oeste, city located in central-western of Brazil, the biomonitoring with *Tradescantia pallida* (Rose) Hunt var. purpurea is a complementary tool to the Surveillance Program in Environmental Health-related Air Quality - (VIGIAR/MS). This region is characterized by the biomass burning. In winter, in a natural event of this biome, occurs the burning of the vegetation of cerrado. During the period between the months of April to November sugar-cane plantations are burned, for harvesting and for processing of ethanol and sugar. The aim of this study was apply alternative approaches to identifying and defining the participation of the pollution sources, estimating the risk to human health.

The study was conducted at April 2009 to December 2010 in five sites in Mirassol D'Oeste, and one in rural area. The genotoxicity effects was tested monthly performed the bioassay of micronuclei in *Tradescantia pallida* (Trad-MCN).The bioaccumulation of air pollution-related elements was determined in *Tradescantia pallida* leaves using energy dispersive X-ray fluorescence (EDXRF) spectrometry at two moments, March of 2010 and July of 2010. Total daily records of respiratory diseases hospital admissions (ICD X, Chapter J: J00 a J99) were obtained from Health Information System Governmental Agency of Mato Grosso State.

Trad-MCN values of biomass burning period were higher than values of the period non-burning for all monitoring sites. Similarly, respiratory diseases hospital admissions varied substantially between the two periods, biomass burning and non-burning with observation on increasing of number of records in the age groups 0-4 years old and > 65 years old, mainly during April-September (period of biomass burning). EDXRF results demonstrate that Mirassol D'Oeste show different characteristics of bioaccumulation of elements that correlate with adverse health effects, as found for Iron, Aluminium, Zinc and Sulfur. Increases in Trad-MCN and in hospital admissions for respiratory diseases in biomass burning demonstrate that the burning of biomass, as of the sugar cane plantation, results in negative impact in health of population at Mirassol D'Oeste. It was concluded by the results that monitoring with *Tradescantia pallida* proved to be effective as complementary tool at Surveillance Program in Environmental Health-related to Air Quality-VIGIAR/MS.

Air Polution

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A New Support Tool for Health Risk Management in Emerging Countries

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Over 1.3 million people die from outdoor air pollution in the world every year, especially in large cities of emerging countries. In Brazil, air quality standards were approved in 1990 by the Environmental National Council (Conama) and its review has been discussed in São Paulo state, based on WHO guidelines. The present study evaluated the health risk due to air pollution in São Paulo state (SE Brazil), establishing the adequacy of the national air quality standards through the application of a Hazardous Index.

The study area corresponds to the industrial region of São Paulo, comprising 184 cities and more than 30 millions of people, in 133,030 km^2. The maximum concentrations of SO_2, NO_2, O_3, CO and PM_{10} during 2010 were considered as the Hazardous parameters. The Exposure parameters were considered as the population density and sensitivity location (percentage of population under five years and over than 65 years old) for each city. A health risk index based on Fuzzy logic was performed to integrate the selected parameter, giving the likelihood of reaching different risk levels. ArcGis 10 software was utilized for data gathering, spatial representation of parameters and the Risk Score Maps.

The higher values of risk were observed in the metropolitan area of São Paulo and close to the cities of Cubatão and Piracicaba. Those risks are related especially to vehicular, industrial and sugar cane burning emissions, respectively. Discussions about the need to revise the air quality standards in São Paulo state has intensified over the past five years. Generally, the indices used for air quality do not consider the population exposed. This study showed the integration of GIS with fuzzy logic methodology as a useful tool to health risk assessment in order to incorporate new technologies that consider exposure parameters, improving the understanding of the population vulnerability related to environmental problems in emerging countries.

Air Polution

Feasibility of using pollen abortion rates, and iron, zinc and sulfur accumulation in tree leaves to assess the risk associated of air pollution exposure at São Paulo municipality.

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Studies over the past 40 years show that air pollution, mainly produced by burning fossil fuels, is responsible for increment of cases of lung cancer, hospital admissions for respiratory diseases, exacerbations of asthma and COPD and increased mortality in different age groups. The vast majority of epidemiological studies correlate the effects of air pollution exposure to levels of pollutants measured from conventional monitoring networks. Conventional methodologies of air quality monitoring are expensive and therefore, are carried out with insufficient distribution for resolution in micro-scale spatial. This can lead to error in the estimates of exposure risk since the monitoring networks often cover a large area that may not reflect small-area exposures. Hypothesis: We hypothesized that bioassays using plants could effectively determine small concentration gradients of pollutants helping to assessment the risk associated of air pollution exposure.

This study aims to evaluate the feasibility of using alternative techniques, pollen abortion rates, and iron, zinc and sulfur accumulation in tree leaves to determine the gradient of air pollution on a small scale and assess the risk associated of air pollution exposure at São Paulo municipality.

The identification of regions with different characteristics to atmospheric contamination samples was determined from the prevalence of deaths from lung cancer and COPD in regions of São Paulo municipality in the period 2004 to 2008. Samples of flower buds and leaves of *Bauhinia* sp were collected in twelve sites at five districts at São Paulo city in May, June and July in 2011 for experimental tests. The genotoxic effects caused by air pollution were tested by bioassay of pollen abortion. The bioaccumulation of Iron, Sulfur and Zinc in leaves of *Bauhinia* sp. was determined using energy disperse X-ray fluorescence (EDXRF) spectrometry.

Partial results for pollen abortion rates and Fe, Zn and S contents in leaves showed significantly difference within and between sites of study.

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Based on preliminary results it is possible to identify variability within and between sites of study, demonstrating that the technique is sensitive enough to identify and highlight the changes in concentration of air pollutants in micro-and macro-regions.

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Influence of traffic-related air pollution on exhaled nitric oxide in healthy adults: a seasonal follow-up

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Ambient air quality is a major concern in Belgium due to the high degree of urbanization and dense traffic networks. It is known that exposure to traffic-related air pollution is associated with adverse respiratory effects. We investigated whether traffic-related air pollutants are associated with fractional exhaled nitric oxide (FeNO) in healthy adults.

The study population consisted of 47 healthy non-smoking adults (25 men, age 16-65 years). FeNO was analyzed in winter and summer using a portable Niox Mino device. Exposure to traffic-related air pollution was assessed for all subjects in both seasons by interpolated NO_2, $PM_{2.5}$, PM_{10} and O_3 concentrations at the home address for various exposure windows (1 to 60 day lags) before FeNO measurement and by using geographical information. Associations between exposure parameters and FeNO were tested using a multiple mixed-effects regression model with age, sex, and recent airway inflammation as covariates.

Various short-term NO_2, $PM_{2.5}$ and PM_{10} exposure windows (2-10 day lagged averages) were significantly associated with FeNO ($p<0.01$). FeNO in winter and summer were highly correlated (Spearman $r=0.68$, $p<0.0001$) and FeNO was higher in men compared to women during the summer period (16.0 vs. 26.0 ppb, Mann-Whitney U test, $p<0.001$).

Conclusion: Exposure to ambient $PM_{2.5}$, PM_{10} and NO_2 at the home address was associated with FeNO, indicative for inflammation of the lower airways in healthy adults.

This study was financed by the Flemish Government (Department of Environment Nature & Energy, Environment & Health unit), and the EU-FP6 project INTARESE.

Air Polution

Biomonitoring the air pollution using tree leaves species native to Brazil and usually found in the streets of São Paulo City

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Understanding the interaction of the urban forest with atmospheric pollution is important to urban planning and public health. The urban forest is able to hold back and absorb air pollution, as well as acting as the low cost biomonitor and providing other advantages. The urban forest is there already and we can use since the plants herbaceous or trees to biomonitoring air pollution. The techniques used are varied, some just monitoring, and others calculating the concentration of pollution. The Ibirapuera Park located in the central area of the city of São Paulo has a heterogeneous urban forest, and inside this park are the main trees found in the streets of São Paulo. This aspect has facilitated the study of the interaction of these trees with air pollution. In order to undertake this study, leaves from these trees were collected and then grounded to traffic-related elements determination by energy disperse X-ray fluorescence (EDXRF) spectrometry. This technique is able to assists in the understanding of the interaction of the elements with the trees, and attributes to the trees the function of ambient biomonitor. Maps were constructed to elements Barium, Cadmium, Chromium, Cupper, Iron and Sulfur to show the spatial elements distribution and correlated with individual sources emissions. These results demonstrated that there is a micro scale relationship between the sources and site of the pollutions. Demonstrating the impact caused by the mobile sources in the same site or not, so far was they are created. This is very important to take same decisions on public health, like limited same places to vehicles during few hours so the sources will be decreased. With this information we can also determine same critical areas in the cities and which the major source in this site. We observed also the effect of protection of the urban forest and the function of barriers of the dispersion of air pollution. When the urban forest is very stratified with trees, herbaceous plants, vines, grasses and very dense the potential of decontamination the air is much better than with just trees and grasses.

Air Polution

Toxicity of fractions of Diesel Exhaust Particles related with pERK and pJNK and citoskeleton.

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Diesel exhaust particulate (DEP) is recognized as public health problem in the context of air pollution, due to the presence of toxic compounds that can cause metabolic changes in respiratory epithelium, thereby exacerbating pre-existing diseases and causing other diseases. The organic fraction, representing 60% of the DEP, enters the lungs, triggers inflammatory reactions and signals pathways. Also contained in the DEP, metal contents can produce reactive oxygen species (ROS) and signal MAPK pathways. The ERK/MAPK phosphorylation route leads to cellular differentiation and proliferation while that of JNK/MAPK results in stress response, cell growth arrest or apoptosis. It is also known that phosphorylated ERK and JNK can disestablish the cell cytoskeleton and that this phenomenon is involved with extrusion vesicles and even apoptosis. Aiming at verifying the possible toxicities of DEP in relation to organic compounds and metals, as well as possible changes related to the ERK/MAPK and JNK/MAPK action in the cytoskeleton. In this context, we evaluated the effects of exposure of epithelial cells (BEAS) to four types of DEP at 100 µg/mL: 1) untreated, 2) Treated with HNO3 to remove metals (ACN), 3) treated with hexane to remove low-polarity organic compounds (HEX), and 4) treated with methanol to remove medium- and high- polarity organic compounds (MET) – plus Grafitte Negative control (GRAF) (100 µg/mL) and Vanadium positive control (200 µM) (V). Cells were exposed via the air-liquid interface system. The MAPK pathway was identified by Western blot films analyzed using protein densitometry. The cytoskeleton was identified by confocal analysis and measured by percentage of fluorescence after Phalloidin-alexa 488 stain. Compared with the control, the results obtained of JNK showed increase of phosphorylation (%). BEAS treated with MET at 15' increased by 300%, at 30’ by 110%, and at 60’ by 93%. ACN phosphorilation gradually increased at 15' by 177%, at 30’ by 252%, and at 60' by 292%. Results for DEP increases were: at 15', by 95%; at 30’, by 66%, and at 60', by 269%. ERK phosphorylation expression increased at 30' by 15%; at 60', by 16%. There was no expression of ERK phosphorylation in the groups treated with ACN and HEX. Results regarding the cytoskeleton showed a statistically significant decrease in BEAS subjected to MET at 15' compared to control group during the same time and during 60' ($p < 0.001$). Also, there was a statistically significant difference at 30’ for V and ACN, and 60' DEP compared to the group treated with MET BEAS at 15' and 60’ ($p < 0.001$).

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The results show that pJNK activation influences the cytoskeleton integrity in the group treated with MET, which could inhibit polymerization of microtubules and induce apoptosis.

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Key words: air pollution, pERK, pJNK, cytoskeleton.

Mucin Profile And Cell Signaling in Tracheal Explants Exposed to Diesel Exhaust Particulate

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Particulate matter from diesel exhaust engines (DEP) has toxicological properties due to physical-chemical characteristics. These properties can activate intracellular signaling pathways and induce changes such as cell growth, differentiation, proliferation, apoptosis as well as alterations in mucins in response to environmental stimuli. This is given by a family of proteins known as mitogen-activated protein kinase (MAPK). The ERK/MAPK pathway typically transduces growth factor signals that lead to cell differentiation or proliferation. The activation of JNK/MAPK pathways results in stress responses, growth arrest or apoptosis. The objective of this study was to evaluate mucus profile and activation of MAPK (ERK and JNK) in tracheal explants using different concentrations (50 and 100 μg/mL) and times (30' and 60') of exposure and compare them to a control group (only medium).

Tracheal explants of 40 Balb/c were maintained in DMEM-F12 with supplements for 24 hours at 37°C and 5% CO_2. They were subsequently exposed to pre-established concentrations. Using an optical microscope (400x) mucus profile was analyzed in histological cuts with stained with Alcian Blue (AB) to determine acidic mucus, and with Periodic Acid Shiff (PAS) to determine neutral mucus. The MAPK pathway was identified by Western blot and films were analyzed using protein densitometry.

The treatment with DEP at a 50 μg/mL 30' led to a significant increase in the amount of acidic mucus and a decrease in neutral mucus compared to controls. Also, there were a significant reduction in mixed mucus at 30' and 60' as well as a greater vacuolization (50 μg/mL) at 30' compared to controls. No difference was observed in the treatment at 100μg/mL at 60'. Western blot analysis showed a slight increase in ERK phosphorylation at 100 μg/mL. in both time periods when compared with the control group. No effect was observed in ERK activation with the DEP treatment at 50 μg/mL. An increase was observed in JNK phosphorylation, at 60' at 50 μg/mL and 30' at 100 μg/mL compared to control.

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Our results suggest that the compounds found in the DEP can release acidic mucus production, enhance vacuolization, activate cell signaling pathways, which could cause inflammation in the airways of mammals without previous lung disease.

Funding: CNPq Processo: 484189/2007-7, FAPESP, LIM-05 HC-FMUSP, INAIRA

Air Polution

Keywords: air pollution, mucin, MAPK.

Cumulative effects on mortality associated with the short-term exposure to particulate matter: a time-series study applied to Lisbon

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This study evaluates the lagged effects on the mortality of Lisbon population, associated with the short-term exposure to PM_{10} (particulate matter with aerodynamic diameter less than 10 µm), during the period 2000-2004. Lisbon, the main city of Portugal, has presently around one half million inhabitants. Although during 2000-2004, daily average levels of PM_{10} in Lisbon have been low in comparison with other European cities, the limits established by European Guidelines have not always been met. This fact and the lack of research on the effects of air pollutants on Lisbon's population mortality, justify the development of current study. The relationship between the daily mortality (for all-diseases, respiratory diseases and cardiovascular diseases) and the daily levels of PM_{10} was assessed using an ecological time-series approach. The magnitudes of these associations, for each group of diseases and for each age group (all-ages, 65+ years), were estimated using generalized additive Poisson models, controlling for potential confounders, such as long-term temporal trends, seasonal variations, influenza epidemic periods and climatic factors.

To estimate the effect of PM_{10} on mortality that persists for more than one day after the exposure, distributed lag models were used. Cumulative effects on mortality were estimated by the adjustment of a second-degree polynomial to the effects of four consecutive days.

In addition, air pollution effects on daily mortality were evaluated using PM_{10} levels for:

• Single-days: mean levels at the day of death, and mean levels at each of the five earlier days;

• Multiple-days: moving averages, up to five days before the death event.

The estimates of lagged effects on all-diseases mortality indicate that a 10 µg/m^3 increase in PM_{10} levels produced increases of 0.62% (95%CI: -0.13-1.37%) on mortality of general population, and of 0.87% (95%CI: 0.05-1.70%) on the elderly mortality.

Although non significant, higher lagged effects were estimated for the mortality by cardiovascular and by respiratory diseases.

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A 10 µg/m^3 increase in PM_{10} levels was associated with increases in cardiovascular mortality of 0.70% (95%CI: -0.40-1.82%) for the general population, and of 1.14% (95%CI: -0.02-2.31%) for the elderly.

An equivalent augment in PM_{10} levels was associated with increases in respiratory mortality of 0.82% (95%CI: -1.52- 3.21%) for the general population and of 1.50% (95%CI: -0.92-3.98%) for the elderly.

A significant association between PM_{10} levels in Lisbon and daily mortality was only found for the elderly, in what concerns all-diseases and cardiovascular diseases (nearly significant).

The elderly were more susceptible to PM_{10} than the general population for all the groups of deaths considered. The mortality risk increase associated to PM_{10} was higher for the respiratory diseases, followed by the cardiovascular diseases and all-diseases. These results are in line with other studies (WHO, 2006).

Obtained results suggest that an increase in PM_{10} concentration in a single-day was associated with mortality effects that persisted for two to five days.

Our estimates are in accordance with those published for US cities (Schwartz, 2003) for the elderly, and for the general population from European cities (Katsouyanni *et al.*, 2003; Anderson *et al.*, 2004).

Urban air pollution in Bangkok during 2011 Thailand floods

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The 2011 flood disaster in Thailand has been considered "the worst flooding yet in terms of the amount of water and people affected". Over 20,000 square kilometers of area was damaged and more than 13 million people were affected. The economic damages and losses due to flooding has been estimated as high as 45 billion US$.

Parts of Bangkok and its vicinity, in particular the north and the west, were under flood in November and December of 2011. During that period, the amount of traffic in Bangkok overall and in the flood area reduced drastically. Base on this situation, we took opportunity to monitor some air pollutants in Bangkok flood area in order to study the effect of reduced traffic on the urban air quality.

Two sets of measurement had been continuously carried out for 3 months starting from middle of flood period in December 2011 to back-to-normal period in February 2012. One set of instruments (CO, ozone, NOx) had been placed at Mahidol University, Salaya which was the flood area 20 kilometers west from the center of Bangkok. Another set of instruments has been set at National Institute of Development Administration (NIDA), the non-flood and less affected area 10 kilometers east from the center of Bangkok.

The results from NIDA show the unchanged urban air pollution characteristics, e.g. high NOx, high CO, and high afternoon ozone mixing ratios. It appeared that the traffic in the east side of Bangkok was not much affected by the flood. Meanwhile, at the flooded Salaya the CO and NO mixing ratios were low in the beginning and gradually increased with the traffic recovery at the end of flood. For example, daily averaged NO mixing ratios at Salaya ranged 0.2-0.7 ppb and 3.8-11.9 ppb during the first week of December 2011 and last week of February 2012, respectively. Ozone at Salaya, however, showed the typical high afternoon and low nighttime mixing ratios during the whole monitoring period implying more influence from the Bangkok metropolitan outflow. It is also noteworthy that the daily minimum ozone mixing ratios during the flood was higher than the ones after flood.

Several interesting features of air pollution have been observed during measurements. Detailed analysis will be presented in the conference.

Occurrence of air pollutants exceedances and hospital admissions for inhabitants of Amadora and Sintra, Portugal

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The exposure to urban air pollutants are still currently a public health issue causing illness and death. Breathing small amounts of pollutants over many years is considered hazardous as well as breathing high concentrations of air pollutants. For this reason, whenever the value of 180 µg/m3 is exceeded, informing the population is required. Traditionally measured pollutants are the fine particulates matter and tropospheric ozone. There is currently no study made to assess the relationship between those pollutants and the frequency of respiratory disease in the called big Lisbon area of Amadora and Sintra which is the second highest density populated region in Portugal. The elder are the most susceptible to air pollution exposure and those with inflammatory disorders of the respiratory airways, such as asthma or severe bronchitis. Children are known as at greater risk because their lungs are still developing.

:This work aims to study the relationship of the exceedances occurred in the air pollutant (PM_{10}) and ambient ozone (O_3) in the Amadora and Sintra municipalities inhabitants and the episodes of hospital admissions due to respiratory causes in all age groups. The data used is from the period between 2004 and 2009.

We appealed to the records of Hospital Diagnostic Groups (GDH), which provide information on indicators of hospitalization for respiratory pathologies classified according to the Disease International Classification (ICD-9). We analyzed all records of respiratory diseases occurred between the years 2004 and 2009, for users whose home is located in the municipalities of Amadora and Sintra and have resorted to three Hospitals of the National Health Service (NHS) – Central, West and North Lisbon Hospitals Centers, and one referral hospital (Fernando da Fonseca). The data corresponding to GDH respiratory diseases were provided by the Central Administration of Health Services (ACSS). The measurements of the two pollutants (ozone and particulates) were provided by the online database of Portuguese Environment Agency, Department of Atmospheric Air Quality. The analysis was made for the entire years and all seasons.

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In this work we found that whenever occurred exceedances in the concentrations of PM10 and ambient ozone (O3) also occur an increase in the registration numbers of respiratory diseases in Hospitals Centers and in Unit Hospital Reference.

Respiratory diseases records were greater in the months that occurred O_3 exceedances concentrations. However, the excess values of PM_{10} didn't t cause an increase in hospital admissions. Respiratory diseases were more frequent in the winter months, but also increased with the summer heat waves (2004 to 2009)

The results of the present study suggest a relationship between the concentrations of ozone and fine particulate matter excess and respiratory diseases registered in the year in which the concentrations of these two pollutants were above the legal permitted levels. These values indicate that some care should be implemented in order to reduce PM_{10} and ozone concentrations in Amadora and Sintra municipalities.

Variation of micronucleus frequency in *Tradescantia pallida* (Rose) Hunt. var. purpurea Boom in urban parks at São Paulo city (Brasil).

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The presence of urban green areas is often correlated with climate regulation and improvement of air quality. However, few biomonitoring tests established a correlation of the presence (or absence) of trees and possible amendments to the genotoxic effects of air pollutants in urban parks. The micronucleus test in *Tradescantia* (Trad-MCN) is effective in detecting genotoxic effects in living organisms and has been widely used for environmental monitoring. This work studied the variation of the genotoxic potential of air pollution in urban parks and wooded urban parks with few trees (trees too young) using the method Trad-MCN. The micronucleus test in Tradescantia pallida (Trad-MCN) was made with floral button from plants set up in four city parks in the city of São Paulo located next to major avenues to vehicular traffic, two of then wooded (Piqueri park and Lina and Paula Raia park) and two with young trees (Aricanduva park and Cordeiro park). Samples were obtained monthly for five months, fixed, processed, stained and analyzed by optical microscopy. The differences between the frequencies of micronuclei were evaluated by ANOVA and Post Hoc Tests SPSS. The results of the Trad-MCN test showed statistically significant differences between the frequency of micronuclei in wooded parkland (Lina: 2453 ± 1174; Piqueri: 2547 ± 1484, p> 0.001) and the other ones (Aricanduva: 4747 ± 1379; Lamb: 4293 ± 1479, p> 0.001). Partial results of this study suggest that urban areas with more vegetation and mature trees have a lower frequency of micronuclei when compared with the frequency obtained in plants grown in urban parks with lower plant density. It also indicates that despite the genotoxic potential of air pollution, ground cover with mature trees would be able to reduce their possible adverse biological effects experimentally demonstrating the potential of trees in improving air quality in urban centers.

Air Polution

Application of ozone and low temperature plasma environment to reduction of selected carcinogenic compounds in asphalt industry off-gases

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Bitumen, a by-product of oil-refining, is mainly used in paving and roofing. In paving operations, bitumen is heated and mixed with mineral aggregates. The use of recycled materials and industrial by-products in asphalt mixtures is increasing. Hot bitumen (130–200^{o}C) emits vapours and aerosols (fumes) that contain various compounds, including polycyclic aromatic hydrocarbons (PAHs) and sulphur-containing organochemicals.

Bitumen fumes contain 1–5-ring unsubstituted PAHs, alkylated PAHs, heterocyclic PAHs and terpenoids which may have mutagenic and carcinogenic activity. Additionally some of these compounds are odour causing compounds.

One of the effective ways of biochemical and chemical deactivation of odour causing and carcinogenic compounds is application of ozone and low temperature plasma environment. In these conditions the most stable organic compounds including monoaromatic and polyaromatic compounds can be oxidized.

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In the experiment degradation of volatile organic compounds from asphalt industry, including odour causing compounds, was conducted. With this end in view a special plasmachemical reactor was developed. In analytical part solid phase microextraction and GC-MS was applied for identification and quantitative measurements. Additionally for some of the compounds degradation pathway was elucidated. It was observed that compounds containing heteroatoms were easier degradable than compounds containing condensed rings and aliphatic substituted benzene rings.

The preliminary results of our investigations showed that methods utilizing ozone and/or low temperature plasma environment could be successfully applied for degradation of odour causing and carcinogenic compounds emitted in off-gases originating from asphalt industry. These methods can be however applied in specific conditions, after precise determination of process parameters and identification of the formed products.

Keywords: ozone, low temperature plasma, asphalt off-gases.

Integrated approach for air quality assessment in an industrial area located in the coastal of central Asturias, Spain

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In this study, instrumental and biomonitoring techniques were integrated with three main objectives: (i) to analyze temporal patterns of PM10 concentrations in order to apportion emissions sources; (ii) to investigate spatial patterns of lichen conductivity to identify the impact of the studied industrial area in the air quality and (iii) to establish relationships between lichen conductivity and some site-specific characteristics.

Samples of the epiphytic lichen Parmelia sulcata were transplanted in a grid of 18 km per 20 km, having the industrial area in the center. Lichens were exposed for a 5 month period, starting in April 2010. After exposure, lichen samples were soaked in 18 MΩ water aiming the determination of the water electrical conductivity and, consequently, the lichen vitality and cell damage. A marked decreasing gradient of the lichens conductivity relative to the distance from the emitting sources was observed. Transplants from a sampling site close to the industrial area reached values 10 times higher than the ones far from it. This fact showed that the lichens reacted in the polluted industrial area by a physiological response increasing their conductivity accordantly to the contamination level.

The analysis of lichen conductivity indicated the existence of high levels in the surroundings of the industrial area when compared with the reference values revealing the existence of a physiological response to environmental stress. Transplants worked as an environmental sensor as physiological damage coincides with the most polluted areas. The results obtained showed that kriging is a robust technique for identifying areas affected by emission sources, allowing the identification of the focal points of emissions. A marked decreasing gradient of the lichens conductivity relative to the distance from the emitting sources was observed.

The integration of temporal PM10 measurements and the analysis of wind direction corroborate the importance of this industrialized area for the air quality and identify the relevance of traffic for the studied urban area, located in the north of Spain. Maritime air mass transport has a significant role on particulate air quality in this region. Maritime transport scenarios were very frequent and promoted the decrease of particle concentrations.

Air Polution

Impact of Maritime Air Mass Trajectories on the Western European Coast Urban Aerosol

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Lisbon is the largest urban area in the Western European coast. Due to this geographical position, the Atlantic Ocean is an important source of particles and plays an important role in many atmospheric processes. The main objectives of this work were 1) to perform a chemical characterization of PM2.5 sampled in Lisbon, 2) to identify the main sources of particles and to determine their contribution to this urban area and 3) to assess the impact of maritime air mass trajectories on the concentration and composition of respirable particles sampled in Lisbon. During 2007, PM2.5 was collected on a daily basis in the centre of Lisbon with a Partisol sampler. The exposed teflon filters were measured by gravimetry and were cut into two parts: one was analysed by Instrumental Neutron Activation Analysis and the other by Ion Chromatography. Principal Component Analysis and Multilinear Regression Analysis were used to identify possible sources of PM2.5 and to determine their mass contribution. Five main groups of sources were identified: secondary aerosols, traffic, a source of calcium, soil and sea. Four days backward trajectories, ending in Lisbon, at the starting sampling time were calculated with the Hysplit Model. Results showed that maritime transport scenarios were very frequent. These episodes were characterized by a significant decrease of anthropogenic aerosol concentrations and had a significant role on the air quality from this urban area.

Air Polution

Impact of Air Pollution on Cardiorespiratory Diseases in Setúbal, Portugal

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Several epidemiological studies have shown associations between air pollution and adverse effects on human health. Specific–cause effects were found for cardiovascular and respiratory diseases including an aggravation of asthma, acute reductions in lung function, myocardial infarction, heart failure, low birth weight in newborns and death.

The aim of this study was to find a relationship between air pollution (with special focus onto PM_{10}, $PM_{2.5}$, and O_3) and hospital admissions in Setúbal region, Portugal. Setúbal is a Portuguese city where heavy industrial activities coexist with an urban area that has 125.293 inhabitants and with an environmentally sensible region (Sado Estuary and Arrábida Natural Park).

A database with air quality and hospital admission data was built for 5 years (2005-2009). Hourly air quality concentration values were obtained from 4 measuring stations located in Setúbal region (Setúbal and Palmela municipality's). Regarding hospital admissions, health data was obtained from the Central Administration of the Health System (ACSS). Daily counts of Setúbal hospital admissions were assessed for all circulatory-related causes and all respiratory related causes, according to the International Statistical Classification of Diseases, Ninth Revision (ICD-9). Condition breakdown was as follows: (1) All circulatory conditions (ICD-9; 390–459), and distributed by cardiac diseases (ICD-9; 390–429), ischemic heart disease (ICD-9; 410–414), and stroke (ICD-9; 430–438); (2) All respiratory conditions (ICD-9; 470–519), and distributed by asthma (ICD-9; 493) and chronic obstructive pulmonary disease (ICD-9; 490–492, 495, 496). All data were split into the following age interals: 0–14, 15–64, >64 years old.

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A longitudinal time-series study was conducted, with risks being quantified by means of multiple linear regression models considering as dependent variable the weekly hospital admissions registered in Setúbal and as independent variable the weekly mean PM_{10}, $PM_{2.5}$ and O_3 concentration values.

Determination of fugitive emissions during harbour operations

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Fugitive emissions pose problems both for general air quality management as well as for the operational management of the facilities. Managing local particles concentrations can be a frustrating affair because the weight of fugitive sources could be very high comparing with the local anthropogenic stationary sources.

In harbours, activities such loading, unloading and transport of dusty materials are important sources of particles fugitive emissions. Therefore, there is a growing concern about air quality in harbours as a result of the high impact of the operations on human health and environment. In addition, these activities may have an impact on the levels of Air Particulate Matter (APM) at nearby urban areas, depending on the materials, the type of operation and the meteorological scenarios.

The aim of this study was to estimate the impact of harbour activities on APM levels and composition. This work was based on experimental campaigns carried out in a Portuguese harbour when four types of bulk materials – sugar, fertilizer, phosphorite from Syria and phosphorite from Morocco - were handled. High time resolution monitors were installed close to the unloaded area and recorded APM concentrations and meteorological variables.

$PM_{2.5}$ and $PM_{2.5-10}$ were also collected during unloading operations, in polycarbonate filters by Gent samplers. A complete chemical characterization of collected samples was made by the techniques Instrumental Neutron Activation Analysis and Particle Induced X-Ray Emission.

Results showed that manipulation of materials during harbour operations resulted in high emissions of particles, principally from the coarse fraction. These emissions were very affected by the granulometry of the handled materials and by the meteorological conditions

Air Polution

Geospatial distribution of trace element air pollution in the North of Spain using biomonitors

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Monitoring of elemental atmospheric pollution is essential due to its impact on both ecosystem performance and human health. Source apportionment is regarded as an important parallel result in order to establish air pollution control programmes. Biomonitoring techniques can be advantageously used to indicate geographical related variances in trace element air pollution and to identify emission sources, with a reduced infra-structure and manpower costs associated with the survey of large areas.

The aim of this study was to combine biomonitoring techniques with geographic information systems (GIS) in order to assess the impact of an industrial area from the North of Spain onto the air quality.

Samples of the epiphytic lichen *Parmelia sulcata* were collected from olive trees in an unpolluted Portuguese rural area (Montargil, Portugal) and transplanted to the north of Spain, in a grid of 18 km per 20 km, having an industrial area at its centre. In addition, a higher density of lichens was exposed near the three main sources of air pollution in the studied area – a cement mill, a power plant and a steelwork. Lichens were exposed during 5 months, starting in April and ending in September 2010. After exposure the technique Instrumental Neutron Activation Analysis, using the k_0 methodology, was used to determine the concentrations of the elements Al, Fe, Sc, La, Sm, Na, Cl, I, Br, V, Sb, As, Zn, Cu, Ca and U.

The spatial distribution pattern of the elements concentrations was modelled using the programme ArcGIS 10. Based on samples results, continuous surfaces of elements distributions estimations were obtained using an inverse distance weighted (IDW) interpolation technique. The GIS provided the framework for geospatial integration of elements concentrations distribution, land topography, land use and existing roads, making it possible to evaluate the spatial correlation between them.

Results showed that some elements presented a similar spatial distribution. Three main types of patterns were identified indicating the existence of three principal types of sources: the soil identified by the elements Al, Fe, Sc, La and Sm; the sea identified by Na, Cl, I, Br and the anthropogenic sources associated with Sb, V, As, Zn and Cu. For the anthropogenic elements, an exponential decrease in the concentrations with increasing distance from the industrial area was observed. The spatial integration of these data (topography and element concentration) emphasised the importance of the topography in the pollutant dispersion.

Impact of Sahara dust transport on Cape Verde atmospheric element particles

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Sahara desert is the most important source of mineral dust, contributing as much as 1900 million tons per year. Due to its localization, Cape Verde is ideal to quantify and to characterize the dust transported from Sahara desert. Cape Verde is an archipelago composed by 10 islands, localized in Atlantic Ocean, near African coast. Santiago's island is the biggest island of Cape Verde, with an area of 991 km^2 and was the selected to perform this study. This work was developed within the project *Atmospheric aerosol in Cape Verde region: seasonal evaluation of composition, sources and transport* (CV-Dust) - that aims to assess the transport of dust from Sahara by using an integration of measuring and modelling tools.

Air Polution

Complementary tools were used to identify the likely Air Particulate Matter (APM) provenance, such as back trajectory-based method, satellite images and APM chemical analysis. PM_{10} was collected in Praia city (14º94'N; 23º49'W) with a Tecora® sampler in order to characterize the element chemical composition. The collected filters were weighted by gravimetry using a Mettler® Toledo balance with 0.1 µg readability, placed in a controlled clean room (class 10,000). All samples were irradiated at the Portuguese Research Reactor (RPI-ITN; nominal power: 1MW) during 5 h, and measured for 5-7 h after 2-5 days and 4 weeks of decay, in high-purity and high-resolution germanium detectors. A comparator – Al-0.1% Au alloy disk – was also irradiated and measured for application of the k_0-INAA methodology.

Results showed that during the dust events PM_{10} concentrations increased significantly. The maximum concentration of 494µg/m^3 was reached in an event that occurred in February 2011. k_0-INAA showed to be very well suited to assess the Sahara dust contribution because this technique can determine with accuracy the concentration of some crustal elements. The measured crustal elements Fe, La, Sc and Sm presented significantly higher concentrations in Cape Verde comparing with other studies performed in Lisbon by our research groups. These elements reached the highest concentrations during air mass transport provided from Sahara Desert.

Short-term association between exposure to ozone and mortality in Oporto, Portugal

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Exposures to air pollution in developed countries have generally decreased over the last two decades. However, many recent epidemiological studies have consistently shown positive associations between low-level exposure to air pollutants and health outcomes. In Portugal, very few studies have analysed the acute effect of air pollutants on health.

The present study evaluates the association between exposure to air pollution and daily mortality in the Oporto Metropolitan Area, Portugal.

Generalised additive models were used for this analysis. Pollutants assessed were ozone, nitrogen dioxide, and particulate matter (PM10). Models were adjusted for time trend, seasonality, and weather.

We report that an increase of 10 mg/m3 in the daily ozone 8-h maximum moving-average corresponds to an increase of 0.95% (95%CI: 0.30, 1.60) and 1.58% (95%CI: 0.45, 2.73) in non-accidental mortality and cardiovascular mortality, respectively, in the summer season. A significant effect of 0.67% (95% CI: 0.03:1.32) was also found for the association between PM10 and non-accidental mortality in the summer season. Associations with ozone and PM10 exposures were higher in the elderly people. No significant effects on mortality were observed during the summer season with nitrogen dioxide exposures.

Our analyses provide the first significant evidence in Oporto that exposures to O3 and PM10 have adverse effects on the health of the general population in the summer months.

Air Polution

Assessment of exposure to airborne ultrafine particles in urban environments

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The aim of this study was the assessment of exposure to ultrafine in the urban environment of Lisbon, Portugal, due to automobile traffic, and consisted on the determination of deposited alveolar surface area in an avenue leading to the town centre of a major European town during late Spring. Our research approach considers the measurement of surface deposited alveolar area of particles in the outdoor urban environment of Lisbon, Portugal.

These type of measurements have not been done so far. Only $PM_{2.5}$ and PM_{10} have been measured in outdoor environments and the levels found cannot be found responsible for all the observed health effects. In fact, the exposure to nano and ultrafine particles has not been assessed systematically, and several authors consider this as a real knowledge gap and claim for data such as this which will allow for deriving better and more comprehensive epidemiologic studies. Nano Surface Area Monitors (NSAM) equipments are recent ones and its use has been limited to indoor atmospheres. However, as this study shows, NSAM is a very powerful tool for outdoor environments also. As most lung diseases are, in fact, related to deposition of the alveolar region of the lung, the metric used in this study is the ideal one.

This study revealed differentiated patterns for week days and weekends, which could be related with the fluxes of automobile traffic. During a typical week, ultrafine particles alveolar deposited surface area varied between 35.0 and 89.2 $\mu m^2/cm^3$, which is comparable with levels reported for other towns such in Germany and United States. These measurements were also complemented by measuring the electrical mobility diameter (varying from 18.3 to 128.3 nm) and number of particles which showed higher values than those previously reported for Madrid and Brisbane. Also, electronic microscopy showed that collected particles were composed of carbonaceous agglomerates, typical of particles emitted by the exhaustion of diesel vehicles.

It should be noted that, although measured parameters such as the deposited area and the dose per lung area, are elevated when compared with baseline values, mainly for week days where automobile traffic is more intense, they cannot, at this stage, be ascertained as toxicity indicators. Nevertheless, they point out for important contamination of potentially hazardous particles released from automobile traffic in urban environments.

Air Polution

Data obtained in this study is a basic information allowing to understand the relationship between exposure to ultrafine particles in urban atmospheres and health affections, which can be taken as the basis for epidemiologic studies. As ultrafine particles can have a significant lifetime in urban air, possible effects on health cannot be neglected.

The air we breathe in Lisbon: chemical composition of atmospheric aerosols

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According to the World Health Organization (WHO), air pollution is a major environmental risk to health. Urban outdoor air pollution is estimated to cause 1.3 million deaths worldwide per year. The main risks in major cities come from exposure to aerosols, i.e. particulate matter (PM) and ozone (O_3). It is possible to derive a quantitative cause-effect relationship between the levels of these pollutants and the increase of mortality by respiratory infections, heart disease, and lung cancer. Significant reduction of exposure to air pollution can be achieved by lowering the concentrations of the main air pollutants emitted during the combustion of fossil fuels. Such measures will also reduce greenhouse gases and contribute to the mitigation of global warming. In large cities these goals are not easily attained mainly because of the high level of traffic .In fact, atmospheric pollution due to particulate matter is an environmental issue of increasing concern in most European large cities, namely in Lisbon where in some places the maximum levels of these pollutants are exceeded in several days of the year, mostly in summer.

Air Polution

The adverse health effects of the aerosols can be better understood and better treated if the chemical composition of the in taken fine particles, thus interacting with the circulatory and respiratory system, is known.

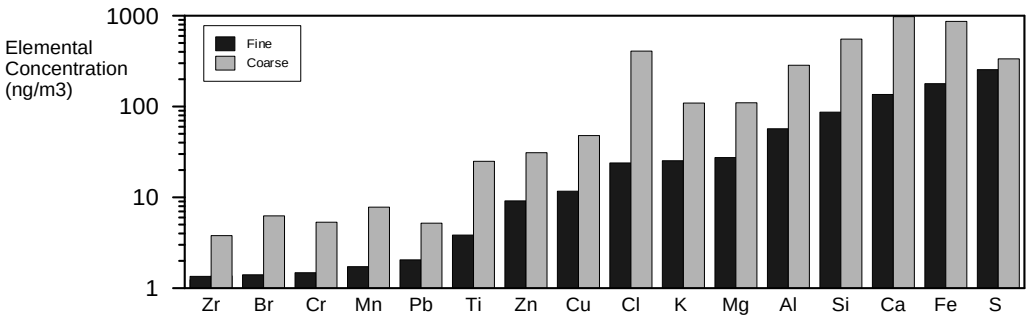

Figure 1 – Major elements in amospheric aerosols from Av. Liberdade; summer 2008.

In this work two intensive air sampling campaigns have been made to collect information about composition of atmospheric aerosols that impact Lisbon. Aerosols were collectedsimultaneously at two urban sites in the city: a main city avenue of intense road traffic (Avenida da Liberdade) and a residential area (Olivais), in a summer between June and July 2008 and a winter campaign between January and February 2009.

Aerosol samples were collected on Nuclepore 47 mm diameter filters of different porosities (8 and 0.4 µm) assembled in two sequential stages. Mass concentration of sampled particulate matter was determined gravimetrically.

The elemental content of the deposit was determined by Proton Induced X-ray Emission (PIXE) for the elements with atomic number higher than 12. The aqueous extract of the filters was analyzed by ion chromatography, IC, for both anions and cations (Cl^-, NO_2^-, Br^-, NO_3^-, PO_4^{3-}, SO_4^{2-}, Na^+, NH_4^+, K^+, Mg^{2+} and Ca^{2+}).

A typical composition of the fine aerosol from Avenida da Liberdade is shown in figure 1. The major elements are the ones that have their origin on the earth crust. Some minor constituents can also be seen in a reasonable concentration, their origin being associated with traffic emissions. Some deleterious elements were also found. The complete set of results will be presented at the conference.

Air pollution impact on respiratory and circulatory diseases in Lisbon, Portugal

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Numerous time series, ecological and epidemiological studies have shown a relationship between outdoor levels of gaseous and particulate matter pollution and adverse effects upon human health, mainly regarding to respiratory and circulatory diseases.

Hospital admissions data were collected to establish a relationship with air pollution.

The considered diseases were cardiovascular and respiratory diseases and the data were distributed by age in order to conclude if each age group is a relevant factor in the relationships.

The records were daily registered in 13 Lisbon hospitals and compiled by age: <15, 15-64; >64 years old for the period 2006-2008. The health data was obtained from the Central Administration of the Health System (ACSS).

Air Polution

Air quality data (PM_{10}, SO_2, NO, NO_2, CO, and O_3) were obtained from monitoring stations of the Portuguese Environmental Agency, which provided hourly observations of different atmospheric pollutants for the same studied period (2006-2008).

The study area includes the municipalities of Loures, Odivelas, Lisboa, Amadora, Oeiras and Cascais, with a total area of 448 km^2 and an average (over 2006-2008) resident population of 1 378 868 inhabitants, according to the c (INE).

The measuring stations were chosen in counties whose population was covered by the hospitals for which the disease data were collected.

Ordinary least squares linear regression was used to investigate the impact of regulated air pollutants on hospital emergencies for respiratory and circulatory diseases for several age groups in Lisbon during two years

Impact of GSTM1, GSTT1, GSTP1 Polymorphism and Environmental Lead Exposure on Oxidative Stress Biomarkers

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Oxidative stress and genetic related to antioxidants could influence on susceptibility to lead (Pb) toxicity. In this study, we aim to examine the effects of genetic variations of glutathione S-transferase (GST) gene on oxidative stress alterations (by the measurements of malondialdehyde; MDA and glutathione ; GSH) among general population. Realtime-PCR with Taqman probes was performed to analyze GSTM1, GSTT1 and GSTP1 Ile105Val. Blood lead and GSH levels were determined by spectrophotometer. MDA level was measured by HPLC with fluorescence detector. Mean blood Pb level in this study group was 4.85 µg/dL (ranged 2.00 and 18.50 µg/dL). Gender, cigarette smoking and alcohol consumption affected significant blood Pb levels. To further investigate, blood Pb levels were calculated into 3 tertiles and statistical results found only in tertile 3. Individuals with the Val/Val allele for GSTP1-105 had higher blood Pb, and MDA levels but lower GSH level compared with individuals with Ile/Ile genotype ($p<0.05$). Similar results were found in GSTM1 deletion, except for the GSH levels. In contrast, no effects of GSTT1 on three parameters were observed. Our findings support consideration of genetic variations of GSH-related genes as the important risk factor for lead toxic effects in the general population with environmental exposure.

Environmental Toxicology

Monitoring Movement Behaviors of Caenorhabdities elegans in Response to the Formaldehyde at Low Concentrations

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This study describes a new approach for the assessing of toxic response behaviors of *Caenorhabdities elegans* using automatic recognition of line movement through image processing system. The movement behavior of *C. elegans* is different at low concentrations of formaldehyde after treatment. A comparison of toxic response behavior between the concentrations were found to be similar however, *C. elegans* has shown more toxic response behavior at 1 mg/l formaldehyde. This study is identified some sequential line-movements of nematode that confirmed the toxic effect on the nematode response behaviors.

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Keywords: Monitoring, behaviors, formaldehyde and *Caenorhabdities elegans*

Trophic status of Lakes in China

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There are more than 2.800 lakes with an area of 1 km^2 each, and 130 lakes with an area of more than 100 km^2 each in China. 20 lakes in China dry up each year. Over the past 50 years country has lost more than 1000 natural water reservoirs. The main reason of this is the active development of industry. China over-uses fresh water. The lakes are drained to create new areas for agriculture. The forests along the shores of reservoirs are cut down that leads to shallowing of lakes. Industrial waste water entering the lakes contain chemical compounds came from metallurgy, textile, pharmaceutical, food, pulp and paper industries. Nitrogen and phosphorus contained in the municipal and agricultural runoff also come to the lakes. This results in signifi cant accumulation of pollutants and nutrients. About 80% of the lakes in the valleys of the Yangtze River “bloom”, and this creates ideal conditions for algae reproduction. When dying-off they consume a lot of oxygen from the water mass. The lack of oxygen kills shellfish and other inhabitants of the lakes. As a result, the lakes turn into swamps. Thus, the main ecological environmental problems of the lakes of China are toxicophication and eutrophication.

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In connection with the above mentioned, the purpose of this study was to assess the trophic status of some freshwater lakes in China.

The aim of our research was to assess trophic status of five great freshwater lakes of China. Our research is based on the approach developed by OECD. A quantitative typological classification system was developed by a study group sponsored by the Organization for Economic Cooperation and Development (OECD). Classification based on yearly averages for total phosphorus. They produced a classification system based on the probability that a lake will have a given trophic status. Trophic lake types suggested by OECD are ultraoligotrophic (UO), oligotrophic (O), mesotrophic (M), eutrophic (E) and hypereutrophic (HE). Probability distribution curve for the average lake total phosphorus (TP) have been approximated by us analytical expressions. The results of calculations and evaluation of trophic status are shown in the Table. Critical phosphorus loading for five great freshwater lakes are calculated. The relationship between average and maximal depth of lakes is revealed.

Probability estimation of the trophic status of five great lakes of China, %

Lake	TP, $mg \cdot m^{-3}$	P_{UO}	P_O	P_M	P_E	P_{HE}
Poyang	97	0	0	12	66	22
Dongting	119	0	0	7	61	32
Taihu	52	0	3	41	50	6
Hongze	140	0	0	4	55	41
Chaohu	105	0	0	10	64	26

Biomonitoring in Ecotoxicology: influence of gender and age on heavy metal content in different organs of Iberian wolf (*Canis lupus signatus spp*)

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Ecotoxicology is the study of the effects of toxic chemicals on biological organisms, especially at the population, community and/or ecosystem level. The Iberian wolf (*Canis lupus signatus*) is a top-consumer of the food cycle, therefore accumulating different environmental contaminants within its biological tissues. In this sense, ecotoxicological studies based on these species can be useful for evaluating the adverse effects of heavy metals, and thus those mammals can constitute an adequate tool for biomonitoring activities.

At the present work, samples from liver, kidney and hair of Iberian wolf from NW Spain were obtained after population control activities and run over accidents. Animals from both genders where considered for the study, and the age (animals being divided in young and adult) was determined, too. After acid digestion of the samples, heavy metal content (Pb and Zn) was quantified by means of inductively coupled plasma-optical emission spectrometry (ICP-OES).

With respect to the whole population, the highest mean values were quantified, as expected, for the physiological element Zn, with a maximum corresponding to a hair sample, and a minimum to kidney (<20 ppm). When considering Pb, the maximum concentration was observed in liver, reaching to more than 5 ppm, and the minimum in hair.

According to age, it could be interested to emphasize that in all samples, heavy metal content was higher in adults when compared to young animals, on a statistically significant level ($p<0.01$) mainly for Pb. This result is clearly in accordance with the specific kinetic of this toxic metal, whose levels increase along the life of the animal.

On the other hand, and when considering the effect of gender, there was a more evident variability, even if in general higher levels were mainly associated to males (once more, specially for Pb) in the case of internal organs, and for females in the case of hair. Nevertheless, no statistically significant differences were observed between both groups.

The statistical study of correlations allowed determining the existence of a single interesting correlation, between Pb content in both liver and hair samples for the whole population, thus rendering the non-destructive sample as an adequate tissue for future environmental biomonitoring of Pb in the wild.

White stork (*Ciconia ciconia*) as bioindicator of environmental pollution: evolution of heavy metals (Pb, Cd, Hg) and As from 1998 to 2009.

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The white stork (*Ciconia ciconia*) can be considered a good bioindicator of environmental pollution produced by man in urban environments. It is a species high located in the food chain, which population is increasing every year and most of the European population nests in the Iberian Peninsula. Currently, colonies living near human populations feed on landfills where they find food during the whole year, and every year more specimens do not migrate to Africa in summer. The main goal of this study was to evaluate the evolution in the levels of heavy metals (Pb, Cd, Hg) and As in a ten years period, in a colony of white storks feeding and living nearby a sanitary landfill. The relation between the levels of Pb in blood and δ-aminolevulinic acid dehydratase (ALA-d) enzyme activity, a biomarker of the lead toxicity, was also studied.

Blood samples were collected from chicks of a white stork colony, nearby Cáceres (Spain), at 4.7 km away from a landfill. The samples were collected in the same colony during the years 1998/9 (n=47) and 2008/9 (n=34), in order to study the evolution in the level of metals during this ten years period. Pb, Cd, Hg and As levels in blood were measured using inductively coupled plasma mass spectrometry (ICP-MS) after diluting the blood in a NH4OH (0.7 mM), Triton X-100 (0.07% v/v) and EDTA (0.01 mM) solution. Additionally, blood was collected from the same colony in the years 2009 (n=10) and 2011 (n=19) to study the relation between levels of Pb and ALA-d activity.

The mean As blood concentration, expressed in mean ± SD, decreased from 1998/9 (54.0 ± 53.9 µg/L) to 2008/9 (41.5 ± 22.9 µg/L), however these differences were not statistically significant ($p<0.05$).

Cd concentration in blood raised slightly between 1998/9 (0.22 ± 0.18 µg/L) and 2008/9 (0.26 ± 0.20 µg/L), without significant statistical differences ($p<0.05$).

The mean levels of heavy metals Hg and Pb declined from 1998/9 to 2008/9. Mean Hg in the years 1998/9 was 68.3 ± 62.2 µg/L and decrease to 22.8 ± 12.7 µg/L in 2008/9. Pb mean blood concentration was 113.4 ± 87.2 µg/L in 1998/9 and 60.0 ± 20.9 µg/L in 2008/9.

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These differences in both groups of years were statistically significant ($p<0.05$) and can be related to the ban on unleaded gasoline (Council Directive 98/70/EC, in Spain it was carried out in 2001) and restrictions in domestic use of mercury (batteries, thermometers).

ALA-d enzyme activity was negatively correlated with Pb levels ($r=-0,69$, statistically significant at $p<0,01$) as was expected.

AhR is involved in HCB-inducing effect on cell proliferation, TGF-β1 expression, and ERK1/2 activation

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Hexachlorobenzene (HCB) is a toxic polyhalogenated aromatic compound, widely distributed in the environment. HCB exposure is associated with a wide variety of toxic effects in humans and experimental animals. Serious hepatotoxic, neurotoxic, developmental and endocrine dysfunctions have been reported. HCB is also known to be a promoter of liver foci growth and rat mammary tumors. HCB is a weak agonist of the arylhydrocarbon receptor (AhR), which is a cytosolic ligand-dependent transcription factor. It has been proposed that upon ligand binding, and translocation to the nucleus, the AhR dimerizes with the AhR nuclear translocator and binds to xenobiotic-responsive elements in the enhancer region of target genes. HCB also stimulates growth factor receptor signaling pathways and c-Src kinase activity in rat liver. We have previously demonstrated that HCB increases TGF-β1 expression and induces loss of the homeostatic balance between cell growth and cell death in rat liver. TGF-β1 in normal epithelial cells has an antiproliferative and pro-apoptotic action, through different pathways. In tumor cells this response is lost or reduced, and TGF-β1 may become a stimulator of proliferation, invasion, angiogenesis, and metastasis. The molecular interplay between TGF- β1 signaling and the AhR pathway has been reported. Our aim was to study: 1) the effect of HCB on cell proliferation, TGF-β1, AhR, c-Myc and p53 expression, in the liver of female Wistar rats, treated with dietilnitrosamina (DEN) (50 mg/kg), to initiate carcinogenesis, followed by HCB (100 mg /kg p. c.), administered by gavage, for 8 weeks (DEN+HCB). 2) the expression of GST-P, TGF-β1 and AhR in the preneoplastic lesions under the initiation/promotion protocol. 3) the role of AhR on HCB (5, 50, 500 and 5000 nM)-induced cell proliferation, ERK1/2 activation, and TGF-β1 expression in the human transformed liver cell line Hep-G2. Our results, *in vivo*, showed that HCB significantly increased the protein levels of PCNA, 60%, c-Myc, 36 %, and p53, 45%, evaluated by inmunoblot, in the liver of DEN+HCB group compared to DEN. Protein levels of TGF-β1 and AhR were also increased 50 % and 40 %, ($p \leq 0.01$), respectively, in the DEN+HCB group compared to DEN. HCB significantly increased TGF-β1 (45 %), mRNA levels, evaluated by RT-PCR, in livers from DEN+HCB group compared to DEN.

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Protein levels of TGF-β1, and AhR, determined by immunohistochemistry, increased 62 and 51%, ($p \leq 0.001$, $p \leq 0.01$, respectively), in focal areas compared to non focal areas. HCB increased PCNA, TGF-β1 and phosphorylated ERK1/2 protein levels in a dose- and time-dependent manner in HEP-G2 cells. When cells were preincubated with the AhR antagonist, 4,7 orthophenanthroline, HCB (5 μM) stimulatory effect on the former parameters were blocked. Conclusion: Overexpression of TGF-β1 and AhR in the focal areas of rat liver, suggest that these proteins may be involved in HCB-stimulatory effect on cell proliferation. AhR is a mediator of HCB-inducing effect on cell proliferation, TGF-β1 expression, and ERK1/2 activation as demonstrated in HEP-G2 cell line.

Chlorpyrifos organophosphorous pesticide differentially alters redox metabolism in estrogen-dependent and estrogen-independent breast cancer cells.

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Chlorpyrifos (CPF) is a broad spectrum organophosphorous pesticide (OPs) that is widely used throughout the world in agriculture and non-agriculture applications. Oxidative stress has been described in acute, chronic, and developmental exposure to OPs, in both animals and humans, as well as in some *in vitro* studies. Although reactive oxygen species (ROS) modulate various biological processes, they can cause severe damage to DNA, protein and lipids. It has been reported that moderate increase of ROS may stimulate cell proliferation and estrogens may induce oxidative stress in MCF-7 cells. Previously, we have studied the effect of CPF on cell proliferation in estrogen-dependent (MCF-7) and in estrogen-independent (MDA-MB-231) breast cancer cell lines. We observed that CPF 50 µM inhibits clonogenicity, increases the doubling time and induces apoptosis in both lines. The cell cycle analysis showed that MCF-7 and MDA-MB-231 cells are arrested at S and G2/M phases, respectively, when they were treated with CPF 50 µM. On the other hand, CPF at 5.10^{-2} µM stimulated MCF-7 cell proliferation and the phosphorylation of a tyrosine residue in position 537 in the estrogen receptor alpha, which resulted implicated in the pesticide action. In contrast, CPF did not affect MDA-MB-231 cells proliferation at any dose assayed. To understand the mechanism implicated in cell proliferation modulation by CPF exposure, we analyzed the effect of the pesticide on redox metabolism. Concentrations ranging from 5.10^{-2} to 50 µM were tested. We studied ROS content by flow citometry by staining cells with DCF-2DA. The activity enzymes implicated in redox balance such as catalase, superoxide dismutase (SOD) and glutation transferase (GST) were measured by spectrometry. Our results demonstrated that CPF 50 µM produces an increment of the ROS content in both cell lines (32% over control in MCF-7, 108% over control in MDA-MB-231, $p<0.001$). This action was reverted by addition of catalase 30 IU/mL in MCF-7, but had not affected MDA-MB-231 response. Furthermore, catalase activity resulted increased in both cell lines exposed to CPF 50 and 5 µM (78% over control in MCF-7, $p<0.05$; 98% over control in MDA-MB-231, $p<0.05$). CPF 50 µM decreased SOD activity in MCF-7 (60% vs. control, $p<0.05$) but CPF 5.10^{-1} and 5.10^{-2} µM induced this enzyme activity (115 and 92% vs. control respectively, $p<0.001$). In MDA-MB-231 cells, SOD activity was not modified at any concentration assayed.

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Finally, CPF 50 µM increased GST activity (226% over control, $p<0.001$) and CPF 5.10^{-2} µM decreased the activity of this enzyme (60% vs. control, $p<0.05$) in MCF-7. No changes were observed in MDA-MB-231 exposed to CPF at any dose assayed.

In summary, CPF differently affects the oxidant-antioxidant balance in MCF-7 and MDA-MB-231 cells. These alterations may conduce to the inhibition of cell proliferation observed in estrogen dependent and independent breast cancer cells exposed to CPF 50 µM. Conversely, CPF 5.10^{-2} µM only affected redox metabolism in MCF-7 cells which could be related to the xenoestrogenic action of the pesticide at this dose on this cell line.

Hexachlorobenzene induces thyroid dysfunction and an imbalance in the homeostasis of FRTL-5 thyroid cells growth, involving apoptosis and cycle arrest.

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Hexachlorobenzene (HCB) is a widespread and persistent environmental pollutant with deleterious effect on human health. It is a weak ligand of the aryl hydrocarbon receptor (AhR). Chronic administration of HCB to laboratory animals elicits a number of effects including, thyroid and reproductive dysfunctions and immunopathology. We have previously demonstrated that HCB induced TGF-β1 expression and apoptosis in thyroid gland and thyroid follicular cell line FRTL-5. It is known that TGF-β1 inhibits cell proliferation, upregulating the expression of cell cycle regulatory proteins such as p21, p27, p15 and p16, resulting in cell growth arrest or apoptosis in normal epithelial cells. Moreover, TGF-β1 inhibits a number of functional parameters. The aim of the present study was to assess the effect of HCB on the functional parameter, thyroglobulin (TG), the oxidative status, and cell cycle progression in the rat normal thyroid cell line FRTL-5. We also determined the role of TGF-β1, AhR, and ROS in HCB induced apoptosis. Cells were exposed to HCB (0.005, 0.05, 0.5, and 5 µM) for different periods of time. TG, p27 and cyclin D1 protein levels were assessed by Western blot. mRNA levels of antioxidant enzymes catalase and superoxide dismutase-1 (SOD1), was determined by RT-PCR. Intracellular ROS generation was measured using an oxidation sensitive fluorescent probe, DCFH-DA. Cell cycle progression was assayed by flow cytometry with propidium iodine staining. Cell viability, was determined using the MTT assay, in the absence or presence of specific inhibitors. FRTL-5 cells exposed to HCB (5 µM, for 24 h) decreased TG protein levels (50 % $p<0.05$). HCB (5 µM) induced ROS generation (4h) (455% $p<0.01$) and decreased the expression of SOD1 (6 h) (50 % $p<0.05$). However the expression of catalase was significantly increased (106, 120, 146 and 150%) after 8 h of treatment with HCB (0.005, 0.05, 0.5 and 5 µM), respectively. Cell viability loss, induced by HCB, was restored to control levels, when assayed in the presence of the ROS scavenger, TROLOX. p27 levels significantly increased (165, 114 and 96%) in the nuclear fraction at 2, 4 and 6 h after HCB (5 µM) exposure. HCB (5 µM) decreased nuclear cyclin D1 protein levels (40, 50, 60 and 80%, $p<0.05$), at 4, 6, 24 and 30 h, respectively. The cell cycle progression was arrested in G1 (72 h) and G2/M (24 h) phases with HCB 5 µM. Assays in the presence of TGF-β receptor type-I inhibitor, SB431542, or an AhR antagonist, 4,7-orthophenantroline, showed that neither TGF-β1 or AhR were involved in HCB induced apoptosis. In conclusion, our results show for the first time, that HCB induces thyroid dysfunction and an imbalance in the homeostasis of FRTL-5 thyroid cells growth, involving apoptosis and cycle arrest.

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Hexachlorobenzene enhances tumor growth, metalloprotease expression and metastasis in breast cancer models

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Hexachlorobenzene (HCB) is an organochlorine pesticide considered as a probable human carcinogen. This pollutant was found in puerperal mother milk and in samples of bovine milk for human consumption. It is a dioxin-like compound and a weak ligand of the aryl hydrocarbon receptor (AhR), which is a transcription factor that modulates processes as apoptosis, proliferation and cell migration. In previous studies, we found that HCB induced c-Src/HER1/STAT5b and HER1/ERK1/2 signaling pathways and cell migration and invasion in estrogen receptor α (-) (ERα-) MDA-MB-231 breast cancer cell line. We also observed that HCB stimulated metalloproteases (MMPs) 2 and 9 expression, as well as MMP9 secretion and activity. c-Src, HER1 and AhR were involved in all these HCB-induced effects in MDA-MB-231. HER1 and c-Src tyrosine kinases are overexpressed in a high percentage of human breast cancers, and they cooperate in tumor formation and progression, promoting processes like cell migration and invasion, MMPs activities and metastasis. The aim of our study was to investigate the HCB action on tumor growth, MMP2 and MMP9 expression, c-Src/HER1 signaling pathway activity and metastasis using animal models of spontaneous and experimental metastasis. We used three different experimental models: a) MDA-MB-231 cells xenotransplanted s.c. into NU/NU mice, b) C4-HI mammary carcinomas transplanted s.c into BALB/c mice (syngeneic hormone receptor positive tumors) and c) LM3 cells inoculated i.v. into BALB/c mice, a syngeneic hormone receptor negative model of experimental metastasis. Animals were treated with HCB (0.3, 3 and 30 mg/kg b.w.) dissolved in corn oil or with vehicle. In the xenograft model, HCB stimulated tumor growth at 0.3 and 3 mg/kg b.w. ($p<0.001$), whereas the pesticide also increased c-Src, HER1, ERK1/2 and STAT5b activities, as well as MMP2 (95 %, $p<0.05$) and MMP9 (178 %, $p<0.01$) protein levels in mammary tumors at all assayed doses. Similarly, we found that HCB (0.3 and 3 mg/kg b.w.) enhanced C4-HI mammary tumor growth ($p<0.001$), as well as the number of lung (190%, $p<0.05$ and 230% $p<0.001$) and liver (200%, $p<0.05$ at 0.3 mg/kg b.w) micrometastasis. Furthermore, we observed that the pesticide (3 mg/kg b.w.) enhanced the size of the LM3 lung metastasis (185%, $p<0.05$).

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In conclusion, in the present work we demonstrate that HCB promotes tumor growth and/or metastasis in three different experimental models *in vivo* of breast cancer irrespective to the hormone receptor status of the tumors. This enhance correlated with an increased activation of the c-Src/HER1/STAT5b and HER1/ERK1/2 signaling pathways, as well as MMP2 and MMP9 expression as observed in the MDA-MB-231 xenograft model. These results highlight the promoting effect that this pesticide exerts on breast cancer progression.

Potential hepatoprotective effects of fruit extracts in human hepatocytes

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Environmental pollutants are sources of several ROS and other byproducts of oxidative stress. Such products involve the underlining processes of chronic diseases, either at the initial or progressive stages of the diseases. The antioxidant nutrients and related bioactive compounds common in vegetables and fruits have become a profitable alternative to prevent oxidative stress in cells. The present study was done to determine and compare chemical and cellular antioxidant activity of the extracts of fruits which frequently consumed in Thailand: strawberry, carambola, guava, long kong, pomelo, and tangerine. The protective effects of these Thai fruits on H_2O_2 induced cytotoxicity were also evaluated in human hepatocytes (HepG2). Fruits extracts were analyzed for their total phenolic contents, as well as for their antioxidant activity through three chemical assays: ORAC, FRAP, and DPPH. Cellular antioxidant activity (CAA) assay was used to measure the ability of antioxidants in fruits to prevented oxidation of cell membrane lipids and produce more radicals in cells and the results were expressed in micromoles of quercetin equivalents. The cytoprotective potential was assessed by MTT assay. The chemical antioxidant activity assays showed that strawberry, carambola, guava which rich in phenolic content had higher activity in the DPPH, FRAP, and ORAC assays than long kong, pomelo and tangerine which had lower phenolic content. The antioxidant efficacy of fruits in CAA values was in agreement with that measured by using chemical assays. However, cell viability measured after co-treatment the fruit extracts with H_2O_2 showed the similar cytoprotective ability of all fruit extracts. The study demonstrates that all fruit extracts have protective effect on H_2O_2 induced oxidative damage in hepatic cells and this effect is related to their antioxidant property.

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Cobalt-induced changes in the spleen of mice from different stages of development

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Although cobalt (II) is an essential trace element long-term exposure and large amounts of its salts can have deleterious effects on humans and animals. Since it can be found in the environment, food and water exposure to this metal is unavoidable. Cobalt (Co) accumulates in organs such as spleen, kidney, heart, liver, etc. Its salts affect body weight of patients and experimental animals but the mechanism remains to be elucidated.

The aim of the present study is to investigate the effect of cobalt EDTA (Co-EDTA) on spleen of developing mice.

Pregnant balb/c mice in late gestation were subjected to Co-EDTA treatment at daily doses of 75 mg/kg or 125 mg/kg. The compound was obtained from drinking water. Mice drinking pure tap water were used as controls. Animals were fed a standard diet and had access *ad libitum*. Mice were maintained in individual cages to ensure that all animals obtained the required dose. They were weighed weekly and cobalt concentration was adjusted accordingly. The newborn pups were sacrificed on days 18, 25, 30, 45, 60 and 90 which correspond to different stages of development. The spleens were excised, weighed and processed for histological analysis. Histological paraffin sections were stained by hematoxylin-eosin and observed on a light microscope. Spleen index (SI) was calculated as a ratio of spleen weight to body weight. Cobalt (II) bioaccumulation in the spleen was determined using flame atomic absorption spectrometry (FAAS).

Preliminary results showed that long-term treatment of mice with low or high dose Co-EDTA disturbed extramedullar hematopoiesis in the spleen. The number of megakaryocytes was reduced compared to control samples. SI was reduced in d18 mice treated with low or high dose Co-EDTA compared to the control group. Exposure to 75 mg/kg led to an increase of the index in all other experimental groups. The high dose Co-EDTA increased SI only in mature mice up to d60. FAAS analysis revealed significant cobalt (II) accumulation in the spleen of treated mice. More Co(II) was measured in the spleens of d18 mice compared to the other experimental groups which indicates that they are more sensitive to treatment.

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Exposure to cobalt-EDTA causes accumulation of Co(II) in the spleen which leads probably to the reduced SI and disturbed hematopoiesis. These results correspond to our previous data that long-term treatment with Co-EDTA induces changes in some hematological parameters in mice.

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Neurodegenerative changes in the rat brain provoked by lithium intoxication

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Lithium is extensively used in psychiatric practice for the prevention and treatment of manic-depressive disorders. Lithium-based drugs are known to have a narrow therapeutic and safety range. Nevertheless, neurotoxicity of lithium salts within therapeutic dose has been reported in patients. Lithium intoxication has several neurological manifestations such as encephalopathy, tremor, ataxia, dyskinesia, seizures. These symptoms are usually reversible, however, a number of cases of persistent neurological sequelae have been reported.

Animal models have been insufficiently employed to study the neurotoxicity of lithium. Cerebellar spongiform degeneration has been documented in a rat model of acute lithium intoxication and these data correlate well with findings in humans. However, experimental data on morphological changes in rat brain after chronic lithium treatment are not currently available.

The aim of the present study is to follow up the morphological changes in the rat brain provoked by acute and chronic lithium intoxication as compared to the normal brain aging.

Adult (7-month old) Wistar rats were divided into two experimental groups. The first group was subjected to acute lithium intoxication by a single not lethal dose of lithium chloride (250 mg/kg body weight, 0.2 ml dosing volume in saline, i.p.). The second group received four administrations of lithium chloride with a quarter of the acute dose in the course of eight days (0.2 ml dosing volume in saline, i.p.). Healthy aged (18-month old) rats were injected with the same volume of saline and used as controls.

Different regions of the CNS were studied histologically – cerebral cortex, cerebellum, medulla oblongata, mesencephalon, thalamus and pons, using silver-copper staining for neurodegeneration and luxol fast blue – cresyl violet staining for myelin sheath.

Similar changes were provoked by both acute and chronic lithium treatment. Vacuolization of the brain tissue and subsequent formation of the zones of spongiosis were observed in all studied regions. More intensive compact areas with spongiform changes were found in the cerebral cortex and medulla oblongata. The spongiform changes were observed both in the border and deeper layers of the cortex.

Less pronounced vacuolization was registered in pons and the thalamic region. The diameter of spongiosis vesicles varied from 5 µm to 50 µm. The cerebellum and mesencephalon were the least affected by the intoxication. The vacuolization in the cerebellar white matter without a loss of Purkinje cells, but the classical picture of spongiosis was missing. In contrast, acute lithium intoxication in rats has been reported in the literature to cause widespread vacuolization in the cerebellar white matter without a loss of Purkinje cells. Structure alterations in the aged rat brains were used as positive controls of the observed neurodegenerative changes.

Both acute and chronic lithium intoxication accelerate the neurodegenerative changes concomitant with the normal brain aging. The zones of spongiosis are irregularly distributed throughout different brain regions. The reversibility as well as the quantitative evaluation of the observed changes remain an open question for further studies employing these models.

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Household water lead level in Montreal area (Canada): Predictive factors and seasonal change

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Drinking water represents a potential source of lead exposure. In spite of great interest for water lead exposure, little is known about the seasonal patterns of tap-water lead level (WLL). Furthermore, WLL is subject to within-home variability. The present study aims 1) to determine the predictive factors of drinking WLL, and 2) to model seasonal change of WLL.

A cross-sectional study of 313 private homes supplemented with a longitudinal follow-up on a random sample of 100 of them was undertaken in Montreal (Canada). Homes were selected from four large neighborhoods with possibility of lead services lines (LSL). These were single-house units or multi-units apartment with 3 levels or less. In addition, home should host at least one child under 6 years of age. For the cross-sectional part of study, water samples were collected from Sept-10, (2009) to March-27, (2010). For the longitudinal part, water samples were collected from June-22, (2011) to Sept- 06, (2011). At each water sampling campaign, the first water sample was taken after 5 minutes of flushing (WLLF5), and flow-rate was measured. After a stagnation time of 30 minutes, 4 consecutive 1-liter samples were collected named WLLS1, WLLS2, WLLS3, and WLLS4 respectively. Bootstrap analysis using resampling with replacement was developed to identify best predictors of WLL from candidate variables. Non-linear regression and general linear mixed models were used for modeling seasonal change of WLL. All analyses were performed for homes with high probability of lead services lines (LSL+) and homes without lead services lines (LSL-) separately.

In LSL+ homes, total length of connection and single-family homes were the strongest predictors of high WLL (regardless samples considered). Moreover, 'water temperature' was a significant predictor of high WLLF5, but was not related to WLLS4. Inversely, pH was positively associated with WLLS4 while flow-rate and 'length of inner pipes' were negative. For LSL- homes, WT was the only predictor of WLL and just positively related to WLLF5.

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Non-linear regression suggested that seasonal changes of WLL fitted a sinus function. In LSL+ homes, the minimum predicted value of WLLF5 during winter was 1.6µg/l and peak to 8.3µg/l in mid-July.

The corresponding values were 3.8µg/l and 14.3µg/l for WLLS4, with peak observed on early August.

General linear mixed regression indicated that summer increase of WLLF5 were 0.3µg/l in LSL- homes. The additional increase of 3.6µg/l was observed in LSL+ homes sampled from Sept,10 and Dec,15. The corresponding value was 5.6µg/l for those sampled from Dec,16 and Mar,27. These estimated coefficients remained the same after adjustment for type of residence, flow-rate, length of inner pipes, total length of connection, and neighborhood.

WT, total length of connection, and single-family homes are the strongest predictors of WLL in LSL+ homes. We here show that there is a significant summer increase in WLL. The magnitude of changes is significantly higher in LSL+ homes when compared to LSL- homes. WT is a major contributor to the seasonal changes.

Molecular modifications induced by inorganic Arsenic in Vicia faba investigated by FTIR, FTNIR spectroscopy and genotoxicity tests

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Arsenic (As), a metalloid highly toxic, is one of the major contaminant of soil, water and food. Its presence in food composites is a matter of concern for the well-being of both humans and animals. Inorganic As (iAs) concentrations higher than the limits set by European law, have been recently found in drinking water in some Italian regions. Exposure to iAs through drinking water is a major public health problem affecting most countries. Many of the human health effects of iAs have been established based on epidemiologic studies, which have shown a significant association between the consumption of iAs through drinking water and cancers of the skin, lung, bladder, liver, and kidney, neurologic disease, cardiovascular disease, as well as other non-malignant diseases. However, the exact mechanisms of arsenic-induced cancer and disease are not yet well understood.

The aim of this work is to evaluate the effects of As exposure on *Vicia faba* seedlings by means of infrared (FTIR) and near infrared (FTNIR) spectroscopy in order to investigate molecular modification caused by interaction of plant with iAs. Furthermore, *Vicia faba* seedlings exposed to iAs were used to explore the phytotoxic and genotoxic effects. *Vicia faba* root meristem micronucleus assays (MN assays) and comet test have been used for probing any inducible cytogenetic changes.

We performed contamination of *Vicia faba* with three different solutions, 10 mg, 20 mg, 30 mg L^{-1} of sodium arsenate dibasic heptahydrate. Seedlings were sampled after 18 hours of iAs exposure. The primary roots were cut off and analyzed by comet and MN assays or freeze-dried, and lyophilized in order to carry out FTIR and FTNIR spectroscopic analysis.

Preliminary results obtained by the two spectroscopic techniques showed the effects caused by arsenate mainly related to molecular modifications determined by the chemical interactions of iAs with the biomolecules. Due to the several functional groups involved in molecular modification we can suppose that iAs produces both quantitative and structural changes involving carbohydrates, lipids and nucleic acids. FTNIR spectra showed additional information concerning structural modifications caused by iAs exposure. Infact, the most evident modifications by FTNIR spectra concern the shape of the second overtone band of

aliphatic –CH group also confirmed by the modified shape of –CH band shown by FTIR spectroscopy. We suppose that the modified shape of second overtone –CH band could be the final result of the iAs methylation pathways.

Furthermore, the genotoxicity tests (comet and MN assays) showed significative results at higher iAs concentrations, according to the structural changes involving nucleic acids identified with FTIR. One of the mechanisms by which DNA damage can be induced by iAs might be oxidative stress. iAs is also a clastogen and caused microscopically visible damages or changes to chromosomes.

So, we can summarize that FTIR, FTNIR and genotoxicity tests evidenced that iAs induced molecular modifications mainly in carbohydrates, lipids and nucleic acids.

Multi-residue analysis of 39 pesticides in surface waters of Ria de Aveiro

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A multi-residue gas chromatography-mass spectrometry method was developed in order to evaluate the presence of 39 pesticides of different chemical families (organophosphorus, triazines, imidazole, organochlorine), as well as some of their transformation products, in surface water samples from Ria de Aveiro. Ria de Aveiro is an estuarine coastal lagoon, located in the northern west region of Portugal, which receives inputs from agriculture, urban and industrial activities. The analytical method was developed and validated according international guidelines and showed good linearity, with correlation coefficients higher than 0.9949 for all compounds, adequate precision and accuracy, and high sensitivity.

Pesticides were chosen from the priority pollutants list of the Directive 2008/105/EC of the European Parliament and of the Council (on environmental quality standards in the field of water policy), or were selected due their common use in agricultural practices. Some of these 39 pesticides are, or are suspected to be, endocrine disruptor compounds (EDCs), being capable of altering the endocrine system of wildlife and humans, causing form malfunction and ultimately health problems. Even those pesticides which are not EDCs, are known to be awfully toxic and have a recognised impact in human health.

The aquatic environment is particularly susceptible to pollution due to intentional and accidental release of chemicals to water [3]. Pesticide contamination of surface water is a national issue as it is often used as drinking water. This concern is especially important in rural agricultural areas where population uses small private water supplies, regularly without any laboratory surveillance.

The study was performed in seven sampling points and the results showed a considerable concern pesticide contamination of all samples.

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Environmental Toxicology

Antagonistic role of selenium against hepatotoxic effects of $NiCl_2$ in preimplanted *Wistar albino* rats

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Nickel a potent toxic metal, is very harmful to the environment and to humans because of its *in vivo* accumulation in liver. The present study was conducted to investigate the protective effect of selenium (Se) against nickel toxicity on liver function in *Wistar albino* preimplanted rats.

$NiCl_2$ was given on day 3 of pregnancy either in distilled drinking water at a dose of 20 mg/L/day for 16 consecutive days or as a single s.c. dose of 25, 50, or 100 mg/kg. Se was given as a s.c. injection (0.3 mg/kg) together with the higher dose (100 mg/kg) of NiCl2. Changes in plasma glucose, triglycerides and total cholesterol were measured in treated and control groups on days 5 and 20 of gestation.

$NiCl_2$ s.c. induced on day 5 of gestation a significant ($p<0.05$) decrease in plasma triglycerides, with a dose of 100 mg / kg (-48%). This decrease was maintained at day 20 of gestation with doses of 50 mg / kg (-36%) and 100 mg / kg (-31%). In contrast, the low dose induced an increase of + 50% in plasma triglyceride compared to controls. In addition, NiCl2 s.c. caused on day 5 of gestation a significant decrease ($p <0.05$) in plasma total cholesterol with the low (-50%) and medium doses (-26%). However, the dose of 100 mg / kg induced a significant increase (114%) in plasma total cholesterol on day 20 of gestation compared to controls. $NiCl_2$ s.c. induced a significant increase in plasma glucose (+125%) on day 20 of pregnancy. The pretreatment with Se counteracted the effects of $NiCl_2$ on plasma glucose, total cholesterol and triglycerides.

$NiCl_2$ administered in the drinking water induced a significant increase ($p<0.05$) in plasma triglycerides (+68%) and cholesterol (+49%) on day 20 of gestation, while on day 5 of gestation $NiCl_2$ s.c. Induced a significant decrease in cholesterol (-31%) compared to controls. All doses of $NiCl_2$ induced an alteration of liver architecture. Co-administration of Se with $NiCl_2$ restored the structure of the liver.

These results suggested that selenium has a hepatoprotective role against the toxicity induced by $NiCl_2$ administered subcutaneously in preimplanted rats.

Environmental Toxicology

Distribution of mercury in human body compartments: testing the indicator function of mercury in hair

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Mercury is a toxic heavy metal which is still regarded as a significant health hazard especially related to its neurotoxicity and nephrotoxicity. The general population is primarily exposed to mercury through diet. Fish consumption is the dominant source of organic mercury.

Since organic mercury is incorporated into the root of the hair, its concentration in hair is significantly higher than in blood. The correlation between hair-mercury and blood concentrations, however, is rather good.

The aim of this biomonitoring study was to assess the relationship between hg content of the hair and hg content of inner organs (brain, kidney) to improve the understanding of the consequences of chronic mercury exposure with respect to the distribution within the body and to assess the potential indicator function of hg in hair for the hg values of inner organs.

Samples were taken from five female and five male corpses at the General Hospital Vienna, Austria (22 to 70 years). Samples were taken from brains (hypothalamus, corpus callosum) and kidneys (renal lobe, renal capsule). Furthermore a strand of scalp hair (occipital region) was cut with ceramic scissors to avoid metallic contamination.

Tissue samples were cut into pieces, hair samples were rinsed with de-ionized water. The samples were digested with a mixture of 2 mL 65 vol.% HNO_3 and 0.75 mL 30% H_2O_2 in pressurized teflon vessels in a microwave digestion unit for 40 minutes. The digested solutions were transferred to 20 mL volumetric flasks and finally filled up to 20 mL with de-ionized water.

Total mercury concentrations were determined by atomic fluorescence technique, using the AFS Mercur Plus (Analytik Jena AG) apparatus. Quality assurance was achieved by measuring blank test solutions and reference materials.

Analysis of the different human body tissues resulted in the following mean hg concentrations (in ppb): women 11.5 (hair), 0.1 (corpus callosum), 0.1 (hypothalamus), 5.8 (renal lobe); men 17.5 (hair), 0.1 (corpus callosum), 0.4 (hypothalamus), 1.1 (renal lobe).

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Evaluation showed no correlation between the mercury content of the hair and the kidney tissues, nor between the hair and corpus callosum. Renal capsules were free of mercury.

The correlation between hg in hair and hypothalamus was strong enough to be considered significant (R-Spearman=0.8, p=0.005). Also mercury levels of the hypothalamus and renal lobe revealed a significant correlation. A more detailed analysis showed that the mercury concentrations of the hypothalamus independently correlated with the concentrations in hair and renal lobe.

Hg levels in hair correlated significantly with those in the hypothalamus. However, our analysis does not differentiate between organic and inorganic mercury. As mercury accumulates mainly in its organic forms in hair, it does predict hg levels in brain tissue containing significant amounts of organic mercury. From the correlation with hg in kidney lobes it can be concluded that renal concentrations were dominated by inorganic mercury and that hypothalamic regions contain both organic as well as inorganic mercury.

Mcl-PHAs as non-toxic materials for medical applications

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The development of materials that would contact with the internal environment of the living organism is one of the key tasks of the present time. Among the biodegradable polymers used in medicine a special place take polyhydroxyalkanoates (PHAs). They are a class of biological polyesters produced intracellularly by many bacteria as discrete granules and used as a storage material for carbon and reducing equivalents. PHAs are synthesized when an essential nutrient such as nitrogen, phosphate, magnesium or oxygen is available in limited concentrations and the carbon source is present in excess. Especially, medium-chain-length polyhydroxyalkanoates (mcl-PHAs) have gained much interest in research on biopolymers because of their ease of chemical modification. These polyesters have interesting characteristics similar to those of polypropylene, and therefore can be used instead of the conventional petroleum-based plastics. Being thermoplastic, they are highly biocompatible, biodegradable and non-toxic. PHAs also feature optical activity, piezoelectricity, antioxidant properties. These properties make them promising materials for a variety of applications including food industry, chemical production and medical areas such as tissue engineering and drug delivery. Polyhydroxyalkanoates vary widely in their structure and properties (crystallinity or flexibility) depending on the taxonomic position and physiological-biochemical properties of the producing microorganisms, the culture condition and the carbon source used. In spite of the potential of PHAs, their introduction to the world-wide market is currently limited due to their increased production cost compared to their synthetic alternatives. Therefore, there is a growing need for the development of novel microbial processes using inexpensive carbon sources. Such substrates could be waste vegetable oils generated by the food industry and food service, which create problems with waste management and water pollution.

The aim of present work is to produce mcl-polyhydroxyalkanoates using newly described *Pseudomonas* Gl01 strain capable of utilizing waste rapeseed oil as a cheap feedstock. The final cell concentration, PHAs content and productivity in 48 h were 4,4 g/l, 35% and 32 mg/l·h, respectively. Mcl-PHAs synthesized by the *Pseudomonas* Gl01 strain were isolated and purified to determine the composition by gas chromatography of the 3-hydroxyalkanoates methyl esters. The composition of mcl-PHAs produced by the analyzed strain was found to consist mainly of 3-hydroxyoctanoate and 3-hydroxydecanoate, lesser amounts of 3-hydroxydodecanoate and trace amounts of 3-hydroxyhexanoate. Furthermore, the obtained PHAs were also analyzed by DSC and GPC.

DSC analysis revealed that mcl-PHAs are amorphous and no enthalpy due to melting of crystalline fractions have been observed. The obtained molecular weights for the biopolymer are low compared with those produced by another *Pseudomonas* strain. These mentioned above analysis were important because understanding the physicochemical properties of PHAs is desirable for predicting the properties of these new materials and manipulation of molecular weight can influence the range and performance of end products.

In conclusion, the approach adopted in this study opens a new area for creating new materials for medical and pharmaceutical applications. The production of mcl-PHAs from waste rapeseed oil has been proven to be a step forward towards the ecological production of the environmentally-friendly polymers.

MicroRNA expression in zebrafish (Danio rerio) larvae after short-term exposure to polycyclic aromatic hydrocarbons (PAHs)

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MicroRNAs (miRNAs) form a class of endogenously expressed small, non-coding RNAs, that play key roles in the regulation of gene expression of a broad spectrum of biological processes. Although a number of cell physiologic pathways, potential targets for miRNA regulation, are implicated in the response to environmental contaminants, little is known about the role for miRNA genes in the mechanism of polycyclic aromatic hydrocarbons (PAHs) toxicity in fish. The aim of the present study was to evaluate the expression of two microRNAs, miR-125b, miR-430a-1, that play regulatory roles in zebrafish (*Danio rerio*) development. The larvae were exposed to benzo[*a*]pyrene, phenathrene, its alkyl derivatives (1-methylphenanthrene, 4-methylphenanthrene, 1-phenylphenanthrene, 4-phenylphenanthrene), and their mixture in dose of 1.0 µmol/L each, between 96 and 120 h post fertilization (hpf). After the challenge microRNA levels were evaluated using Real Time qPCR. No significant expression modulation of either microRNA was observed in zebrafish larvae exposed to individual compounds. It was found however that the mixture of PAHs used in the study up-regulated miR-430a-1 in the challenged zebrafish. The results may corroborate previous data showing that PAH-mixtures are capable of modulation gene expression in developing zebrafish larvae.

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Nanosilver in Medical and Consumer Products: Good for Health – Bad for Environment?

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Nano silver is the most used nanoscaled material in consumer products in Germany, whereas most consumers are not aware which products contain nanosilver. There is no obligation for marking the products and the term “nano“ isn’t protected by law, so there are products in the market which are wrongly advertised as “nano“ only for reasons of better selling.

More and more products are created to protect against real or suggested risks of infections or even unpleasant odours. The use of so called “natural” nanosilver is increasing, although silver is reacting as most biocides killing various germs without differentiating between good and bad ones. Furthermore, biocides are contributing to a high degree to the increasing antibiotic resistance of pathogens.

Currently there seems to be a consensus among environmental and health researchers that the use of biocidal nanoscaled silver in consumer products such as clothes, keyboards, waste bags, washing machines etc., is at least in many aspects more harmful if not dangerous than useful.

Moreover, the ongoing discussion about the use of nanosilver for the protection of walls, door handles, handrails, light switches etc, in community facilities, especially in kindergardens, schools, old people’s homes and hospitals, is very controversial. On one hand it is known that thousands of people are suffering from newly acquired serious infections, on the other hand there are means to protect the most vulnerable groups and to lower the risks of infections by making use of biocidal nanosilver for example. Therefore negative effects and risks are to be considered with due attention.This overview concerns new products with nanotechnological protection and highlights the discussion in Germany regarding the environmental and health implications caused by the use of nanosilver in particular. Some outcomes of the “Nanosilver” conference by the Federal Institute for Risk Assessment in February 2012 in Berlin and of the Special Report “Precautionary Strategies for managing Nanomaterials” by the German Advisory Council on the Environment from June 2011 are reported. Last but not least some demands from the non-governmental point of view are presented. Most of the German Environment and Health Non-Governmental Organisations are in favour of an inventory and an effective marking of all kinds of products with nanoscaled material. In the special case of nanosilver they support strongly the restriction of any use for medical indications only.

The rodlet cells of bony fish of the Black Sea

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The violation of the ecological balance of inland waters, and the deteriorating health of produced and farmed fish are important problems for modern fish-breeding and fisheries. The most actual diagnosis is the early diagnosis of pathologies with the help of cytological biomarkers. A research of the ultrastructure of rodlet cells was conducted to solve this problem (Clupeiformes, Perciformes, Scorpaeniformes). The possibility of using these cells as an additional biomarker for assessing the impact of anthropogenic factors on the body of fish is shown.

The stages of the cell development are described according to the classification of VE Matey (1996) According to this classification, there are five stages of rodlet cells. The rodlet cells are found in 2, 3, 4 and 5 stages of development in the kidney of fish, wich we studied.

Stage 2 is characterized by the fact that the cells are intermediate between immature and mature forms. The bundles of fibrils arranged randomly at the periphery of the cell and this is the beginning of the formation of fibrillar layer or capsule cells. The core of the cell is located in the center, numerous cisterns of endoplasmic reticulum, mitochondria, numerous small vesicles and immature round dense granules without core are seen.

Stage 3. Cells have a large fibrillar fully formed shell. Fibrillar layer contains densely arranged fibrils. The core at this stage is shifted to the periphery. On the illustration shown on the slide you can not see the core because the apical part of the cell is photographed. In this part of the cell there are the dark homogeneous granules in which the beginning of the formation from the electron-dense core can be seen.

Stage 4. At this stage of the development of rodlet cells the fibrillar sheath reminds the areas of smooth muscle cells, as dense bodies are distinguishable at high magnification in it. The dense bodies are characteristic for smooth muscle cells. In the apical part of the fibrous cell layer becomes thinner, the plasma membrane is saved only in some cells. The nucleus is located in the basal part of the mature cells, in the apical part the rodlet granules are located in the form of vesicles and maces, small mitochondrions are also found. The electron-dense rod is well-marked in granules.

Stage 5 – is secretory. In the apical part of the cell the piece of the membrane is destroying and the contents of the cell are coming out. The excretion of the contents occurs by the apocrine type, so that the nucleus and sometimes separate granules stay in the cell. So the general scheme of the structure of mature rodlet cells described in our paper is similar to that for a given type of cells in various organs of the previously studied freshwater fish and does not depend on the habitat types. It is important that in studied kidneys of fish species these cells are extremely rare and are not found in all copies of the same species.

Previously, we found massive accumulation of rodlet cells in areas of necrosis of renal tissue by the action of salts of heavy metals and organic pollutants in the body of freshwater bony fish. The majority of rodlet cells were on the 5th stage of the development. The rodlet cells are located along with goblet cells, which are known to be incorporated into the regeneration of organs and tissues.

Thus, such features as the number of rodlet cells per unit area of tissue, the percentage proportion of developmental stages of cells in the tissue can be used as additional biomarkers for assessing the impact of anthropogenic factors on the body of the fish.

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Ethoxyresorufin-O-deethylase (EROD) activity in bream (Abramis brama) as a biomarker of contaminant exposure in the Rybinsk Reservoir, Russia

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Hepatic ethoxyresorufin-*O*-deethylase (EROD) activity is known to be a good biomarker of exposure to polycyclic aromatic and polyhalogenated hydrocarbons. EROD activity was measured in bream (*Abramis brama*) from the Rybinsk Reservoir, Russia, at the end of September 2011. The reservoir has a considerable source of pollution in its north part due to large industrial complex in Cherepovets.

The aims of the present study were (a) to estimate fish response to long-term organic chemical contamination by means of hepatic EROD activity and (b) to obtain data on this biomarker as a background for subsequent studies in the region.

Bream was used as an indicator species since it is the most abundant fish species in the Rybinsk Reservoir. Fish (n = 69) were caught at 7 sites of the reservoir and were collected post spawn to minimize variation due to reproductive activity. EROD activity was determined fluorimetrically on postmitochondrial supernatant.

Individual EROD activities varied from 0.28 to 5.2 pmol/mg/min. Statistically significant differences were observed among fish from various sampling sites (The Kruskal-Wallis test, $p < 0.05$). Gradual increase of hepatic EROD activity in bream was observed upstream the northern part of the reservoir with the greatest mean value at the closest to Cherepovets sampling site. Elevated EROD activity was also detected in fish from one site in the western part of the reservoir. According to results obtained influence of Cherepovets industrial complex is rather strong. It affects fish of all the Sheksna reach. And further, there should be a local source of organic chemical contamination in the western part of the reservoir. Bream subjected to long-term contamination from Cherepovets industry showed approximately 3-fold EROD induction over fish from reference sites.

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Environmental Toxicology

Ultrasonic-assisted enzymatic digestion for total arsenic determination in cooked food: a preliminary study

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Many efforts have been dedicated to solve the problems of extraction of organometallic species in food-related samples. Although solvent extraction (chloroform or methanol) have worked well, the procedures are long, laborious and difficult to apply in routine analysis.

The efficacy of enzymes is well known as a procedure to extract biomolecules attached to organometallic species. The results obtained with trypsin leave no doubts about its effectiveness removing arsenic in materials with a high protein content (fish and shellfish), as well as cellulase and pancreatin enzymes on vegetal material for which trypsin is not useful.

The aim of this study was to compare different enzymatic hydrolysis procedures for the extraction and quantitative determination of total arsenic in cooked foods by FI-HG-AAS using an atomic absorption spectrometer Varian SpectrAA 220.

Environmental Toxicology

Given the characteristics of the food to be studied (a stew prepared with rice, vegetables and meat, cooked in water with an arsenic concentration of 200 ug/l), two enzymes (cellulase and pancreatin) were selected and combined with two agitation processes. The first was assisted by a heated water bath (12 h at 37 °C and 100 rpm) and the second by ultrasound (20 min at 400 W of power and 40 kHz of frequency). To validate methods, we analyzed a certified reference material, Brown Rice CYTED 105PI0272.

The results were analyzed and compared using one-way ANOVA ($p < 0.05$), using the T test for comparison of means using the statistical software SPSS 17.0. The recoveries obtained were: 101% water bath-pancreatin, 104% water bath-cellulase, 99% ultrasound-cellulase and 85% ultrasound-pancreatin. The first three methods showed no significant differences ($p < 0.05$), whereas the process ultrasound-pancreatin had a lower yield, probably due to a short sonication period.

As a concluding remark, the use of ultrasound-enzyme combination as enzymatic hydrolysis procedure for extraction of arsenic in cooked food samples has the advantage of reducing treatment times and reagent consumption.

Environmental risk assessment of arsenic and fluorine in the Chaco province, Argentina: Research advances

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Arsenic and fluoride are recognized worldwide as serious inorganic contaminants in drinking water. In the Chaco Pampean Plain, Argentina, natural occurrences of As and F^- in groundwater come from aquifers comprising Tertiary and Quaternary fluvial and aeolian sediments.

The present study was conducted in the Central–West Region of the Chaco province, northern Argentina. The arsenic and fluoride concentration in groundwater and its adverse human health risk were investigated. The water quality was evaluated by comparing these parameters with permissible limits set by WHO (World Health Organization) and CAA (Código Alimentario Argentino). Total arsenic in water was determined by hydride generation atomic absorption spectroscopy (HG-AAS, Model 4200, Metrolab Instruments) according to APHA norms, 1993. The fluoride concentration was determined electrochemically, using the USEPA ion selective electrode method. Fluorine ionic activity was measured with ion–selective electrodes using OAKTON CE pH/ION Mod. 510.

Mean concentration of arsenic in shallow groundwater was 95 µg/L, 76% of samples (n= 161) exceeded the WHO guideline value of 10 µg/L. In deep groundwater mean arsenic concentration was 90 µg/L, 63% (n= 46) sampled wells exceeded the 10 µg/L. For arsenic health risk assessment, the average daily dose (ADD), hazards quotient (HQ) and cancer risk (CR) were calculated. The values of HQ were found >1 in 77% of the samples collected. This level of contamination should have high chronic risk when compared with USEPA (United States Environmental Protection Agency) guidelines. Furthermore, an important portion of the population has lifetime carcinogenic risk > 10^{-4}, and could possibly suffer from cancer.

The distribution of F^- concentrations was heterogeneous, similar to As. A positive correlation was observed between As and F^- in shallow and deep groundwater (r= 0.33; r= 0.61) respectively. WHO and CAA suggest a limit of fluoride in drinking water as low as 0.8 mg/L under tropical environmental conditions.

Environmental Toxicology

At the shallow groundwater, 39% of the analyzed samples (n= 132) exceeded the guideline value for fluorine concentrations, while at the deep groundwater, 32% of the samples (n= 32) exceeded these value. Exposure of fluoride was calculated and compared with adequate intake of minimal safe level exposure dose of 0.05 mg/kg/day for adults. The calculated exposure dose (ED) was between 0.01 to 0.12 mg/kg/day of fluoride level, 23% of the population are faced with high risk of fluorosis.

Chronic exposure to high arsenic and fluoride levels in this population represents a concern due to possible health effects from their long-term exposure.

Effect of cadmium and monensin on spleen of mice, subjected to subacute cadmium intoxication

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Cadmium (Cd) is a highly toxic environmental pollutant. It has been reported that exposure to Cd induces apoptosis in splenocytes. Different compounds have been tested in animal models as antagonists of Cd, but the information about their effect on Cd-induced alterations in spleen function is sparse. Our recent studies have demonstrated that monensin (a polyether ionophorous antibiotic) improves iron (Fe) homeostasis, whole blood viscosity (WBV), red blood cell distribution width (RBW) in mice subjected to subactute Cd- intoxication. Furthermore, our previous results proved that monensin significantly reduces the concentration of Cd in organs of Cd-intoxicated mice. This study was designed to investigate the effect of Cd and monensin on spleen function in mice, subjected to subacute Cd-intoxication.

Sixty-days old adult male ICR mice were divided into three groups with nine mice in each group as follows: normal control group (received standard diet and distilled water); Cd-treated controls (received 20 mg/kg b. w. $Cd(CH_3COO)_2 \times 2H_2O$ in distilled water once daily for the first two weeks of the experimental protocol); monensin-treated mice (subjected to intoxication with $Cd(CH_3COO)_2 \times 2H_2O$ for two weeks followed by treatment with 16 mg/kg b. w. monensin salt in distilled water during the 15^{th} to the 28^{th} day of the experimental protocol). On the 29^{th} day of the experimental protocol, all the animals were sacrificed under light ether anaesthesia.

Subacute exposure of the animals to Cd induced an increase in the spleen index (SI). The treatment of the Cd-intoxicated mice with monensin significantly reduced SI compared to the Cd-treated controls. The data from the atomic absorption analysis of the spleen of the animals revealed a significant Cd accumulation in the Cd-treated mice compared to the normal controls accompanied with a significant depletion of Fe concentration by 30 %. The treatment of the Cd-intoxicated mice with monensin resulted in a significant decrease of Cd concentration in the spleen by 50 % compared to the Cd-treated controls. Recovery of Fe concentration in the spleen of the Cd-intoxicated mice, subjected to treatment with monensin was observed. The data from the histopathological analysis of the spleen of the animals showed that Cd significantly decreased the number of megakaryocytes compared to normal controls and disturbed extramedullary hematopoiesis.

The number of the megakaryocytes increased when the antibiotic was added, proving the positive effect of monensin on the hematopoesis of Cd-treated mice.

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Ecotoxicology as a tool for evaluating the anthropogenic contamination in the Uberabinha River Basin - Uberlândia - Minas Gerais – Brazil

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The physical, chemical and biological characteristics of water, which together allow the evaluation of its quality, remain associated with a series of processes that occur in the water body and its drainage basin. The consumption of water with quality is of fundamental importance for health promotion and prevention of risks related to water contamination due to the adverse effects of human activities. For each preponderant use of water, there is a required quality, according to the standardization proposal by legislation. The standard of water quality and effluent is required based on laboratory analysis of essentially physical-chemical parameters. However, these parameters are generally insufficient, because it is impossible to determine all the chemical components in a water sample to evaluate its potential toxic effects on the biota. In evaluating the impact of certain substances on aquatic life it is necessary to use living organisms as bioindicators. Thus, this study aimed to promote an integrated evaluation of water quality of the Uberabinha River, in the City of Uberlândia - Minas Gerais - Brazil, which had not been done heretofore. The research was based on the chemical characterization of sediments, because they are substrates for a wide variety of organisms, which feed higher trophic levels and the use of fish as bioindicators of genotoxicity. Four samples were taken in different seasons of the year: rainy, dry, very dry, transition between rainy and dry. Five evaluation points were established, where the water samples and sediments were collected to be forwarded for review and any necessary procedures. In defining these five sampling sites, we sought to identify areas that characterize the natural flow of water upstream and downstream of the city, and the areas where human interferences are significant. For the water samples the following parameters were evaluated: temperature, pH, odor, color, turbidity, hardness, fluoride, phosphate, chloride, nitrate, nitrite, ammonia, sulfates, sulfides, chlorine residuals, surfactants, dissolved oxygen, dissolved solids, COD, BOD, boron, barium, coliforms and fecal coliforms. The Water Quality Index was calculated and compared with the values set out in legislation. For the sediment samples the following parameters were evaluated: fixed solids, volatile solids, aluminum, cadmium, calcium, lead, copper, chromium, iron, manganese, potassium, sodium, zinc, organic matter, total carbon, as well as the pH, density and particle size analysis. Values obtained for the concentrations of cadmium, lead, copper, chromium and zinc were compared with the values of Sediment Quality Guidelines - SQVG, national and international.

Environmental Toxicology

The results obtained with tests performed on specimens of micronucleus Catfish, *Rhamdia quelen*, demonstrated the effect of contamination at the sampled points.

Multivariate statistical analysis was used in the treatment of data, to correlate various contaminants and not only the addition of the toxicity values of the different components analyzed individually.

Environmental impact of intensive horticulture practices on groundwater content of nitrates, sodium, potassium and pesticides

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Recent changes in agricultural practices during the last 20th century have significantly contributed to increase the concentrations of pollutant substances is water, soil and air. Groundwater is a valuable natural resource and as such should be protected from deterioration and chemical pollution. A monitoring program of nitrate, nitrite, potassium, sodium and 28 pesticides was carried out in water samples from an intensive horticulture area in a vulnerable zone from North of Portugal. Eight collecting points were selected and water analyzed in five sampling campaigns, during one year. The multidimensional data analysis methods are very attractive in environmental studies dealing with measurements and monitoring, looking for possible grouping and sources of data variation. The application of such tools is expected to help rationalize confused intrinsic associations within real data and give an insight to identify the pollution sources for effective water resource management and pollution control. Chemometric techniques, such as cluster analysis (CA), principal component analysis (PCA) and discriminant analysis (DA) were used in order to understand the impact of intensive horticulture practices on dug and drilled wells groundwater and to study variations in the hydrochemistry of groundwater.

Nitrates were detected in all water samples and 50% of them exceeded legal limits of 50 mg/l. Inorganic fertilizers such as potassium nitrate were suspected to be the most important factors for nitrate contamination since highly significant Pearson Correlation (p=0.691) was obtained between groundwater nitrate and potassium contents. Sodium content of the groundwaters ranged from 17.4 to 92.9 mg/l contributing to the salinization of coastal aquifers. From a total of 28 pesticides (8 fungicides, 11 insecticides and 9 herbicides) 5 of them were not detected in any sample, acetamiprid, endrin, pendimethalin, phosmet and 2,4D. The most frequent fungicides were cyprodinil, metalaxyl and azoxystrobin. Whereas the most frequent insecticides were pirimicarb and thiamethoxam, followed by dimethoate, dieldrin, cyromazine, o,p'- DDT, methoxychlor and aldrin.

Environmental Toxicology

The most frequent herbicides were atrazine and terbuthylazine and their desetyl-metabolites. Furthermore, it should be highlighted that some pesticides not in use nowadays were detected in some samples.

Water from dug wells is especially prone to contamination from the grower and their closer neighbor's practices. Water from drilled wells is also contaminated from distant practices.

Food frequency consumption in a fishing community from a contaminated estuarine environment. A case study.

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Environmental Toxicology

The Sado River Estuary (W Portugal) has high ecological value and sensitivity to anthropogenic changes. However, this ecosystem possesses strategic economic value regarding fisheries, industry, agriculture, mariculture, leisure and maritime transport. Some of the species inhabiting this estuary have been reported to accumulate and biomagnify toxicant substances originated by both natural processes and human activities, thus leading to a potential public health risk for local populations, especially those that depend on fisheries for living. This paper aims at identifying the dietary pattern of a population residing in a small fishing village located in Sado Estuary (Carrasqueira) and to relate this pattern with estuarine commercial fishing and sediment contamination. Another population (Vila Nova de Milfontes - VNMF), established near a pristine estuary (the Mira), was surveyed as reference. Food frequency questionnaires (FFQ) were applied to a sample of 100 residents in Carrasqueira and VNMF. For each FFQ item, the subjects were asked for average frequency of consumption (seven possible responses ranging from never to 2-3 times per day). The information collected was corrected for seasonality by multiplying the reported frequency consumption by the ratio between the number of months during which the food item was reported. The seven frequency categories originally considered in the questionnaire were then regrouped into three classes: occasionally (never to < 3 month^{-1}), often (1x to 2-4 x week^{-1}) and very frequently (5x wk^{-1} up to 3 x day^{-1}).

Estuarine sediments were analyzed for a wide range of organic and inorganic contaminants together with standard physical parameters.

Local commercially important benthic vertebrate and invertebrate species (flatfish, cuttlefish and clams), were collected from fishing grounds and surveyed for contaminant bioaccumulation.

Metals and polycyclic aromatic hydrocarbons (PAHs) were the main substances of concern. Preliminary results of the FFQ showed that there was no difference in the frequency consumption of fruit, but were significantly higher consumption of cabbage ($p=0.014$), garlic/onions ($p=0.001$), lettuce ($p<0.001$), tomato ($p=0.035$) and cucumber ($p=0.001$) in Carrasqueira ground. In contrast, we found significantly higher frequency consumption of pumpkin ($p<0.001$) and leek ($p<0.001$) in VNMF surrounding grounds. These products are commonly produced by both community members. The results from the FFQ confirm that the estuarine species like clams and soles have an important weight on the dietary patterns of the Carrrasqueira population compared to the control population (sole, $p<0.0001$ and clams, $p=0.004$). Since these species are benthic and sediment contamination data showed there is potential to cause adverse effects to the biota (albeit considerable inter-site variation) it is possible that the exploitations and consumption of these species may be responsible for transferring estuarine toxicants to populations.

Effects of thiodicarb on Wistar rats: biochemical and hematological analysis

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Pesticides are commonly used for prevention of pests improving the crops. Due to the growing application of these chemicals, serious public concern regarding environmental and human health has been raised. Adverse effects in animals and humans include, among others, neurological, reproductive and immunity disorders.

Thiodicarb, dimethyl N, N'-[thiobis[(methylimino)carbonyloxy]] bis[ethanimidothioate], is a synthetic carbamate frequently applied as insecticide and moluscide. The mechanism of carbamates poisoning includes carbamylating of the active site of acetylcholinesterase leading to the inactivation of this enzyme, with a relevant role in nervous system.

This study aims to explore subchronic toxic effects of thiodicarb on Wistar rats, using biochemical and hematological assays. For this purpose, male Wistar rats (4 months old) purchased from Harlan (Spain) were divided into 4 groups and kept in standard laboratory conditions. Food and water was available *ad libitum*. Thiodicarb, at doses of 10, 20, and 40 mg/kg body weight (groups A, B, and C, respectively) was given to animals through drinking water during 30 days. A control group was also considered (group D). Along the exposure period, samples of blood were collected on days 10, 20, and 30 for biochemical determinations: total cholesterol, total protein, Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), urea, creatinine, and alcaline phosphatase, as well as for hematological analysis.

No differences were found within body weight from all groups of animals. In addition, no signs of toxicity were observed among rats. After 10 days, a decrease of total cholesterol was noted in the rats from group C receiving the maximum dose. In addition, a decrease of AST was observed after 20 days on the rats exposed to the lowest dose (group A). At the end of this study, a decrease of the evaluated parameters was observed: total cholesterol and urea in group A; total protein and creatinine in groups A and B; and alcaline phosphatase in group B. However, AST values increased in group B. Concerning the hematological analysis, no significant alterations were noted on red, white blood cells, and hemoglobin.

In conclusion, no significant changes were observed concerning biochemical and hematological parameters among all Wistar rats groups during the 30 days of the *in vivo* assays.

Environment management in chemical industry: different perspectives

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After the industries' production growth in Industrial Revolution, on the 70s and 80s, the respect for the environment and rational use of natural resources by organizations has grown substantially, associated with the birth of a media pressure on the industry's environmental impact.However, there's still a concern about how is being processed the treatment of various types of waste, emissions and / or sludge generated by some industries' sectors. The chemical industry is one of the most impactive for the environment, for example in the sector of paints and varnishes. At a moment when the environment and quality has become a source of positive projection advertising industry, influencing consumer choice, it is necessary to perceive if this industry accompanies the latest available technology, legal requirements and management tools in the environmental area. This comparison of the industries' will be based on environmental aspects of industries, including the issuance of wastewater, waste gas emissions, waste production and adopted cleaner production techniques. The sample was composed by 5 portuguese industries in the sector of paints and varnishes. Data collection was done by three methods: interview, on-site evaluation of industry and collecting records and documentation relating to measurement and quantification of environmental aspects. Contrary to what would be expected, the industry which has an environmental management system implemented has not proven being the most efficient in many of the environmental aspects considered. It was also found that the fact of an industry has implemented a quality management system is not always related to greater sensitivity to environmental issues. The smaller industry, with the process of eco-labeling ongoing has proven to be the most efficient in the management of its factory unit. In this study it was found that there is a major flaw in the management of productive processes and this area is not environmental efficient, despite the enormous impact it produces. Many industries have shown a lack of rigor in the treatment of their data, and there is a miss of perception of the existent technologies for cleaner production, as well as some technical legal terms. Overall, the prism with which each approaches the same environmental aspect is totally different from industry to industry. Concluding, there is a large liberalization in the organization of productive processes in this sector, which may arise from the fact that there is a miss of training, information and strict control of the core industries in the sector of paints and varnishes.

Effect of dietary exposure to polychlorinated biphenyls on hepatic antioxidant system in bream (*Abramis brama* L.)

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Polychlorinated biphenyls (PCBs) exercise their toxic effects through the lipid peroxidation (LPO) mechanisms and it leads to oxidative damage of cells. It is assumed that the study of oxidative stress allows to evaluate the biological effects of pollution and environmental quality. Studies on molecular systems of detoxification and protection of tissues such as antioxidant system (AOS) and LPO are of great importance.

The aim of this work was to study PCBs effect on hepatic AOS and LPO in bream which is the most abundant fish species in the Rybinsk Reservoir, Russia (58°22' N, 38°25' E) and is of fishing interest.

Juvenile bream (weight 113 ± 8g) were acclimated for 10 days prior to experiment. Then fish were randomly allocated in $2m^3$ tanks supplied with dechlorinated aerated flowing water of approximately 9°C. Fish were fed with 1.25% of average body weight once a day (control diet and contaminated diet). Contaminated food was prepared by spraying with ethanol containing Aroclor 1254 and subsequent evaporation of the vehicle so that dose was 2 mg/g forage. Experiment was conducted for 14 days. Fish were killed by blow to the head, liver was excised and shock frozen in liquid nitrogen. The LPO products and AOS parameters were determined spectrofotometrically on supernatant: malondialdehyde (MDA), diene conjugates (DC), total protein contents, and glutathione s-transferase (EC 2.5.1.18), glutathione reductase (EC 1.6.4.2), superoxide dismutase (EC 1.15.1.1), and catalase (EC 1.11.1.6) activities. The PCBs content was analyzed with chromatomasspectrometry method. Statistically significant differences were observed among experimental groups (The Kruskal-Wallis test, $p < 0.05$).

PCBs contents in liver of bream fed with Aroclor 1254-containing food increased during experiment in comparison with control fish. Approximately 5-fold increase of DC and 2-fold increase of MDA contents were registered at the end of experiment in comparison with control fish. Generally mean values of enzymatic activities raised at the end of experiment with decrease at 3-7 days.

Results obtained in the present study are useful for assessment of fish response to anthropogenic stress.

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Environmental Toxicology

Characterization of cytotoxic and genotoxic effects of contaminated sediments from the Sado Estuary and potential human health risk

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The river Sado Estuary (W Portugal) is affected by various sources of pollution, such as heavy-industry, urbanism, mining, agriculture and maritime traffic. Mostly classified as a natural reserve, it also remains a privileged site for fishing activities performed by the local population, who not only consume but distribute their fishery. The present study is part of a broader project whose objective is to evaluate the environmental and human health risks associated with the estuarine benthic environment. This study aims to assess the cytotoxic and genotoxic potential of sediments from several local fishing areas of the Sado Estuary.

Sediments were collected from four geochemically distinct and potentially contaminated sites of the Sado Estuary: sites C and P from the northern shore and sites E and A from the southern shore. A previously characterized sample (F) from the northern shore was added as a positive control. Total organic and inorganic contaminants were extracted with a mixture of methanol: dichloromethane (1:2) and recovered in DMSO. Cytotoxicity and genotoxicity were evaluated through the neutral red uptake assay and by the alkaline comet (coupled with DNA repair endonucleases) and the micronucleus assays, respectively, in the human HepG2 cell line. Cells were exposed for 48h to concentrations of each extract ranging from 0.1 to 20µl/ml of culture medium.

A dose-related decrease in cell viability was observed for extracts F, P and E, indicating sediment contaminant-driven cytotoxicity, whereas no effect was observed for extracts C and A. No significant genotoxicity was observed for extract C, while extract F was clearly genotoxic, as expected. A significant increase in the level of DNA and chromosome damage was observed, by the comet and micronucleus assays, respectively, for sub cytotoxic concentrations of extracts P and E. The level of DNA damage was accentuated following treatment with the DNA repair endonuclease FPG, suggesting the existence of oxidative DNA damage. Extract A was genotoxic in the micronucleus assay and in the comet assay only after FPG treatment. Negative results from sample C leads us to consider it as potential clean reference for further studies.

Environmental Toxicology

Moreover, sediment contamination analysis revealed high levels of metals in all samples except C, whereas only sample P exhibited high levels of known genotoxic polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and DDTs, similar to the previously described for sample F. The differential cytotoxicity and genotoxicity observed in samples from the northern (P) and southern areas (E and A) of the Sado Estuary probably reflects different pressures from a urban and heavy industrialized area versus an intense agricultural area, respectively. The observation that sediment samples have cytotoxic and genotoxic effects, together with the knowledge that contaminants can be accumulated in the edible parts of estuarine species or local agricultural products entering the human food chain, raise concern about a hazardous impact on the health of exposed populations that must be assessed.

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Environmental exposure to arsenic of children in two schools in the city of Rio de Janeiro, Brazil

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Arsenic is a ubiquitous metal in the environment by its natural occurrence and its wide industrial use. Thus, the populations are exposed to possible health risks. Children are more vulnerable to the effects of exposure than adults. Human biomonitoring is a health assessment tool for assessing environmental exposure level of the general population and specific subgroups to environmental contaminants. This study has as its target population children 8-10 years. This study was conducted in two public schools in the municipality of Rio de Janeiro, whose selection criterion was to be located in regions with different socio-environmental characteristics (level of urbanization, pollution sources). Objective: To assess the arsenic exposure of schoolchildren of both sexes.

Cross-sectional study to study population comprised 270 students. Two questionnaires were applied: one with the child and another with his parent/guardian. Anthropometric measurements were taken of the children and sampling of biological material (blood capillary and nail). Analysis of biological material were analyzed by ICP-MS. Statistical analyzes were performed using Stata 10.0.

They were analyzed 232 urine samples provided by the two study groups. Of this total, 71(30.6%) urine samples belong to the group 1 of school children and 161 (69.4%) belong of the group 2 of school children. The average concentration of arsenic in capillary blood of the study population was 2.494 µg/L, with a standard deviation of 0,899, with statistically significant difference with respect to the location of the school. There was a statistically significant difference between the schools studied by comparing the concentration of arsenic in blood of children by quartiles of distribution and exposure variables. Conclusion: The observed values of arsenic above the limit established for unexposed (<1 µg/L ATSDR), in both schools. The minimum values of arsenic found were: 1,22 µg/L for group 1 and 1,07 µg/L for group 2. Our results suggest that these values are considered atypical in unexposed people and they should be submitted a new assessment to define probable route of exposure.

Environmental Toxicology

Removal of Zn from aqueous solutions by *Pseudanabaena* sp.

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Heavy metals pollution is an environmental problem of world-wide concern. Heavy metals are discharged in small quantities into environment through numerous industrial activities. Their presence in aquatic ecosystem poses human health risks and causes harmful effect to living organisms. Conventional methods are extremely expensive or inefficient for metal removal from dilute solutions of dissolved metal. In this context the biosorption process has been recently being evaluated. Biosorption of heavy metal is one of the most promising technologies involved in the removal of toxic metals from industrial waste streams because it offers the advantages of low operating cost, possibility of metal recovery, regeneration of biosorbent and minimization of the volume of chemical and/or biological sludge.

The aim of this work was optimize different parameters (i.e. pH, biomass concentration, contact time). Studies were carried out using different concentrations of biomass *Pseudanabaena* sp. (1.11 - 4.44 g/L), different contact times (5 – 40 min) and different pH (3 - 7). For Zn, using biomass concentration 1.11 g/L the values found q was = 4.59 mg Zn/g. While the removal it was of 87.40 % for Zinc. The results evidence a highest biosorption capacity and removal q = 3.85 mg/g and % rem = 86.99 to Zn for *Pseudanabaena* sp. employed a time of 30 min. The biosorption capacity and removal were q = 4.02 mg/g and 90.33 % for Zn to 5.0. *Pseudanabaena* sp. biomass has a great capacity to remove Cu and Zn and represents an alternative in the treatment of waste waters.

Environmental Toxicology

Cu biosorption by Pseudanabaena sp. Biomass

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The increase in industrial activities has intensified environmental pollution and the deterioration of some ecosystem. The pollution of an aquatic medium can cause changes in physical (temperature, color, viscosity, and surface tension), chemical (chemical oxygen demand, pH, acidity, toxicity levels, and nutrients) and biological characteristics, compromising the water quality for human consumption. Among the various contaminants, heavy metals have received special attention, since some of them are extremely toxic for a large variety of organisms, even at very low concentrations.

Copper is a metal commonly found in industrial wastewater Cu(II) can cause serious potential health issues. It has been found that absorption of excess copper results in “Wilson´s disease” where Cu(II) is deposited in the brain, skin, liver, pancreas and myocardium. In this context, the search for new technologies is strongly recommended. Biosorption is a process that involves the use of biological materials that form complexes with metal ions using their functional group. One of the major advantages of a biosorption system is its economical nature. Moreover, it presents an ecofriendly behavior; the regeneration of biosorbents for multiple uses is easy, it shows selectivity towards different metals and it presents high efficiency.The aim of this work was optimize different parameters (i.e. pH, biomass concentration, contact time). Studies were carried out using different concentrations of biomass *Pseudanabaena* sp. (1.11 - 4.44 g/L), different contact times (5 – 40 min) and different pH (3.0 – 7.0). For Cu, using biomass concentration 1.11 g/L the values found q was = 5.94 mg Cu/g. The results evidence a highest biosorption capacity q = 5.58 mg/g to Cu for *Pseudanabaena* sp. employed a time of 30 min. To pH 6.0 the biosorption capacity was q = 6.11 mg Cu/g. *Pseudanabaena* sp. biomass has a great capacity to remove Cu and represents an alternative in the treatment of wastewaters.

Environmental Toxicology

Ultrasonic-assisted enzymatic digestion for total arsenic determination in cooked food: a preliminary study

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Many efforts have been dedicated to solve the problems of extraction of organometallic species in food-related samples. Although solvent extraction (chloroform or methanol) have worked well, the procedures are long, laborious and difficult to apply in routine analysis.

The efficacy of enzymes is well known as a procedure to extract biomolecules attached to organometallic species. The results obtained with trypsin leave no doubts about its effectiveness removing arsenic in materials with a high protein content (fish and shellfish), as well as cellulase and pancreatin enzymes on vegetal material for which trypsin is not useful.

The aim of this study was to compare different enzymatic hydrolysis procedures for the extraction and quantitative determination of total arsenic in cooked foods by FI-HG-AAS using an atomic absorption spectrometer Varian SpectrAA 220.

Environmental Toxicology

Given the characteristics of the food to be studied (a stew prepared with rice, vegetables and meat, cooked in water with an arsenic concentration of 200 ug/l), two enzymes (cellulase and pancreatin) were selected and combined with two agitation processes. The first was assisted by a heated water bath (12 h at 37 °C and 100 rpm) and the second by ultrasound (20 min at 400 W of power and 40 kHz of frequency). To validate methods, we analyzed a certified reference material, Brown Rice CYTED 105PI0272.

The results were analyzed and compared using one-way ANOVA ($p < 0.05$), using the T test for comparison of means using the statistical software SPSS 17.0. The recoveries obtained were: 101% water bath-pancreatin, 104% water bath-cellulase, 99% ultrasound-cellulase and 85% ultrasound-pancreatin. The first three methods showed no significant differences ($p < 0.05$), whereas the process ultrasound-pancreatin had a lower yield, probably due to a short sonication period.

As a concluding remark, the use of ultrasound-enzyme combination as enzymatic hydrolysis procedure for extraction of arsenic in cooked food samples has the advantage of reducing treatment times and reagent consumption.

Environmental risk assessment of arsenic and fluorine in the Chaco province, Argentina: Research advances

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Arsenic and fluoride are recognized worldwide as serious inorganic contaminants in drinking water. In the Chaco Pampean Plain, Argentina, natural occurrences of As and F^- in groundwater come from aquifers comprising Tertiary and Quaternary fluvial and aeolian sediments. The present study was conducted in the Central–West Region of the Chaco province, northern Argentina. The arsenic and fluoride concentration in groundwater and its adverse human health risk were investigated. The water quality was evaluated by comparing these parameters with permissible limits set by WHO (World Health Organization) and CAA (Código Alimentario Argentino).

Total arsenic in water was determined by hydride generation atomic absorption spectroscopy (HG-AAS, Model 4200, Metrolab Instruments) according to APHA norms, 1993. The fluoride concentration was determined electrochemically, using the USEPA ion selective electrode method. Fluorine ionic activity was measured with ion–selective electrodes using OAKTON CE pH/ION Mod. 510.

Mean concentration of arsenic in shallow groundwater was 95 µg/L, 76% of samples (n= 161) exceeded the WHO guideline value of 10 µg/L. In deep groundwater mean arsenic concentration was 90 µg/L, 63% (n= 46) sampled wells exceeded the 10 µg/L. For arsenic health risk assessment, the average daily dose (ADD), hazards quotient (HQ) and cancer risk (CR) were calculated. The values of HQ were found >1 in 77% of the samples collected. This level of contamination should have high chronic risk when compared with USEPA (United States Environmental Protection Agency) guidelines. Furthermore, an important portion of the population has lifetime carcinogenic risk > 10^{-4}, and could possibly suffer from cancer.

The distribution of F^- concentrations was heterogeneous, similar to As. A positive correlation was observed between As and F^- in shallow and deep groundwater (r= 0.33; r= 0.61) respectively. WHO and CAA suggest a limit of fluoride in drinking water as low as 0.8 mg/L under tropical environmental conditions. At the shallow groundwater, 39% of the analyzed samples (n= 132) exceeded the guideline value for fluorine concentrations, while at the deep groundwater, 32% of the samples (n= 32) exceeded these value. Exposure of fluoride was calculated and compared with adequate intake of minimal safe level exposure dose of 0.05 mg/kg/day for adults.

Environmental Toxicology

The calculated exposure dose (ED) was between 0.01 to 0.12 mg/kg/day of fluoride level, 23% of the population are faced with high risk of fluorosis. Chronic exposure to high arsenic and fluoride levels in this population represents a concern due to possible health effects from their long-term exposure.

Polychlorinated Biphenyls (PCBs) in Inland Waters of Russia

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Polychlorinated biphenyls (PCBs) are one of the abundant groups of environmental contaminants. They belong to the class of bicyclic organochlorine compounds and are referred as the persistent organic pollutants (POPs). PCBs were manufactured and used in the industry in large scales since 1929. Near 2 million tones of PCBs were produced in whole world and entered to environment until cessation of their production in 1986. The PCBs possess such specific properties as bioaccumulation due to high lipophility, high resistance to physical, chemical and biological factors, global occurrence in the environment, and toxicity at extremely low doses. They enter the aquatic ecosystem through transboundary atmospheric transfer and from the local sources. Owing to mentioned above properties PCBs remain in aquatic ecosystems for a long time. Initially they are accumulated in the bottom sediments and then transferred along the food web to the higher trophic levels causing adverse effects in aquatic organisms, fish eating birds and animals, and human. During last 30 years PCBs are in a focus of many ecotoxicological researches. In 2001 the Stokholm Global International Convention on the ban of production and use of POPs including PCBs was signed and Russia joined this convention in 2002. The use and production of PCBs in the countries signed the convention is now prohibited. However, due to high environmental persistence PCBs still occur in the aquatic ecosystems. The environmental monitoring of PCBs in Russia is limited due to deficit of laboratories with appropriate analytical equipment and specialists. In the present study own data and results of other authors concerning different aspects of PCB contamination of freshwater bodies in Russia are summarized and analyzed.

Environmental Toxicology

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Critical Factors to Consider in Chemical Toxicity Testing

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The beneficial effects derived from the use of chemicals in agriculture, energy production, transportation, pharmaceuticals, and other products that improve the quality of life are clearly established. However, continued exposure to these chemicals is only advantageous in conditions where the benefit far outweighs toxic manifestations. By law, determination of risk of toxicity necessitates the use of laboratory animals to establish whether chemical exposure is safe for humans. To simulate the human condition, it is incumbent upon investigators to choose a species in which pharmacokinetic and toxicokinetic principles are established and resemble those of humans. Some of the advantages to the use of rat in chemical toxicity testing include (a) similarities in metabolism, anatomy, and physiological parameters to humans; (b) the short life span, especially for carcinogenesis study; (c) the availability, case of breeding, and maintenance at a relatively low cost; and (d) the existence of a large database to enable comparison of present to reported literature findings. However, the choice of rat can be complicated by several factors such as sex, age, and nutrition, but especially strain, where currently there are over 200 different strains of rat known to exist. The aim of this presentation is to demonstrate that there are differences in the responsiveness of rat strains to chemicals and that the susceptibility observed is dependent on the tissue examined. It is evident that the genotype differs among strains, and this may be responsible for differences in sensitivities to chemicals. Awareness of strain as a factor in susceptibility to toxicant action needs to be taken into account in interpretation of relevance of risk of toxicity for humans.

Towards a risk-based regulatory model for meat safety regulatory monitoring at South African abattoirs

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International trends are moving towards maximising government resources within a regulatory monitoring environment whilst supporting industry sustainability and growth. This shift in approach by governments worldwide began in 1995 with the adoption of the "quality regulation" concept advocated by the Organisation for Economic Co-operation and Development (OECD). Member countries, including Portugal have been working towards the implementation of the quality regulatory approach.

Risk-based regulatory monitoring which is an element of the quality regulation model entails risk profiling of businesses by government. This profile enables government to thereafter focus regulatory resources on those high risk businesses in order to facilitate improved compliance through advice and guidelines.

The approach of co-regulation, which is the shift in responsibility of ensuring an objective such as food safety from government to private operators, was adopted internationally in the mid 1990s in order to improve safe food processing. Co-regulation entailed government regulating broad standards of compliance. In the case of food safety, the Hazard Analysis critical Control Point (HACCP) based systems were regulated by government. Food operators then worked towards meeting these standards through the development and management of business operations within HACCP based systems.

As co-regulation gained momentum, adherents of this approach raised concerns regarding its practical application within smaller, less resourced businesses. Risk-based regulation became a more favourable stop gap at the backdrop of those shortfalls within co-regulation. Regulators generally in South Africa, and particularly in the meat industry, do not at present subscribe to the ideals of risk-based regulation. As part of a doctoral study, the authors present a theoretical model, upon which risk-based regulation may be achieved by meat safety regulators. The authors also present a review of the evolution of meat safety standards and control at South African abattoirs, the emergence of co-regulation within the meat industry and present challenges facing meat safety control in the Republic.

Food Safety

The authors propose that the risk-based regulatory model presented in this paper may not only work towards strengthening co-regulation at abattoirs, but may also improve compliance amongst abattoir operators whilst maximising government resources utilised during monitoring at abattoirs.

Monitoring of Lead and Cadmium in Infant Formulas

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Infant formulas are reconstituted powders fed to infants and young children. They serve as substitutes for human milk. Apart from breast milk, infant formulas have a special role to play in the diets of infants because they are the major source of nutrients for infants, and a unique source of food during the first months of life. Heavy metals are toxic and children are more sensitive to heavy metals than adults.

This study was carried out to monitor the levels of lead (Pb) and cadmium (Cd) in infant formulas and assess dietary exposure / risk to infants population health. The concentrations of Pb and Cd were measured using ICP-MS after microwave digestion. In the analytical method the following metrological characteristics for method validation were calculated: precision, recovery, the limit of detection and the limit of quantification. The samples of infant formulas including domestic and imported products were collected from various retail outlets and markets across Korea.

For risk assessment, probable daily intake was calculated and compared with provisional tolerable weekly or monthly intake (PTWI or PTMI) established by JECFA. The level of overall exposure to Pb and Cd for Korean infants through infant formulas was below the recommended JECFA levels, indicating of little possibility of risk.

On the other hand, the levels of Pb in infant formula were considerably low compared with the current EU standards (20 µg Pb/kg). At the present, the Korean standards of Pb and Cd in infant formula except liquid products are not established. Therefore, this monitoring data can be used for the establishment of Korean standard of Pb and Cd in infant formula.

Food Safety

The evaluation of quality of Mei-Gin during concentrating process at different temperatures

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The concentrated Japanese apricot juice, termed as Mei-Gin with fully organic acids and some bio-active components such as mumefural and Hydroxy methyl furfural(HMF) to be deemed a health food in ancient Asia, is made of *Prunus mume* Sieb. et Zucc.. The traditional producing process is simmering at high temperature for long term in ceramic pot. The different manufacturing processes and simmering time will lead to the different characteristics such as the appearances, physical and chemical properties, qualities and amounts of bio-active components.

The Japanese apricot, with 50 to 60% maturity, underwent washing, squeezing and filtrating steps to collect as juice, subsequently, condensed to be as black, sticky and low fluidity pastes at different temperatures during simmering process. The obtained different pastes were performed the Ames test to elucidate the mutagenicity and the microbiologic test to shown the anti- bacterial activity.

The optimal temperatures for yielding the best Mei-Gin with high bio-activities was obtained. The data has shown that all of Mei-Gin at 5 ug/plate has both of no toxicologic effects and mutagenicity on *Salmonella typhimurium* TA100. The Mei-Gin made of at 115℃ exhibits anti-mutagenic activities against Benzo[a]Pyrene at 42 ± 10 %. Some of commercial products exhibit relative lower anti-mutagenic activities. All of Mei-Gin products have great anti-microbiologic effects on *Staphylococcus aureus*、*Bacillus cereus*、*Escherichia coli* and *S. typhimurium.*

Food Safety

Incidence of Listeria monocytogenes in fast food packaged sandwiches

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The production of fast food has been increasing in response to the change of the Portuguese eating habits, and as a result, an increasing demand for these meals has been observed. The pre-packaged sandwiches are a fast food product, which may contain vegetable, chicken, cheese, among others, and are included in the set of foods that have contributed to making *Listeria monocytogenes* an aspect of public health concern.

In this study, the presence of *Listeria monocytogenes* in chicken and crab sticks pre-packaged sandwiches of the same brand taken from different shops in the Lisbon area was determined in order to evaluate the relationship between the presence of this bacterium and the type of sandwiches. For this purpose culture media, mini VIDAS equipment and Listeria Api galleries were used.

From the results obtained from microbiological analysis, the presence of *Listeria monocytogenes* was detected in 21.7% of the total of 60 sandwiches analyzed, 23.3% of sandwich of crab sticks and 20% of chicken sandwiches. When we compared the types of sandwiches with the presence of *Listeria monocytogenes*, by examining the chi-square, it was found that the study variables were independent, because the value obtained in this test was ($\varkappa^2$=0,098; p = 0,754), thus signifying that there are no statistically significant differences between the variables.

The results indicate that there is no direct relationship between the type of sandwiches and the presence of *Listeria monocytogenes.* However, a future research is recommended including a larger number of samples, the analysis of the sandwiches components separately, and the study of other characteristics (e.g. temperature) that might influence the presence of *Listeria monocytogenes* in ready–to-eat food

Incidence of Aflatoxin M1 in Human Milk and Animal Milk from Jordan

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This study was undertaken to determine the presence of aflatoxin M1 (AFM1) in animal milk and the exposure of infants to aflatoxin M1 (AFM1) and lactating mothers to aflatoxin B1 (AFB1), using AFM1 in breast milk as a biomarker for exposure to AFB1. A total of 100 samples of fresh animal milk (cows, goats, camels and sheep) and fermented milk (buttermilk) and 100 samples of human breast milk were collected during 2010-2011 years. An enzyme –linked immunosorbant assay (ELISA) was used for the analysis of milk samples. AFM1 was detected in all animal milk samples with average concentration of 56.17 ng/kg (range 7.05-129.79 ng/kg) in fresh milk samples and 1079.57 ng/kg (range 47.97-2027.11 ng/kg) in fermented milk. The concentration of AFM1 in 70 samples from fresh and fermented milk were higher than the maximum tolerance limit accepted by European Union and USA (50 ng/kg).

For human milk samples, the average concentration of AFM1 was 67.76 ng/kg(range 9.71-137.18 ng/kg), the concentration of AFM1 in 95 samples were higher than the maximum tolerance limit accepted by European Union and USA (25ng/kg). Logistic regression analysis failed to show a relation between AFM1 and type and amount of dairy consumption, vegetables, fruits and meat. But it was a relation to the cereal consumption. The present study is the first one ever carried on the occurrences of AFM1 in milk consumed by the Jordanian population.

Food Safety

Table R-1: Occurrence of AFM1 in human breast milk

Sample	N	Positive samples	AFM1 contamination (ng\kg)	
			Range	Mean± SD
Human breast milk	80	80 (100%)	9.71- 137.18	67.78 ± 4.6

Table R-2: Human breast milk AFM1 in relation to the amount of cereal consumption

	N	Mean ± SD (ng\Kg)
Less than one cup of cereal per day	39	51.56 ± 5.3
More than one cup of cereal per day	31	93.41 ±S 5.0

Table R-3: AFM1 contamination of fresh animal milk and butter milk

Samples	N	Mean ±SD (ng\Kg)
Fresh animal milk	50	56.17±7.2
Fresh butter milk	50	1079.74±117.76

Table R-4: AFM1 contamination in different kinds of milk samples, exceeding limits established by the EC/Codex, Jordanian and US regulations.

Sample category	Positive samples	Exceeding EC Regulation	Exceeding US Regulation
Fresh animal milk	50	21 (42%)	0 (0%)
Butter milk	50	49 (98%)	43 (86%)
Total	100	70 (70%)	43 (43%)

Study on utilization of pomace from orange to reduce methyl alcohol content in the wine made of fruit

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To reduce the methanol content in orange juice and fermented fruits wine, alcohol insoluble solids (AIS), which is made from squeezed dreg of orange, and alkaline de-esterified AIS (N-AIS) were used to adsorb the existed Pectinesterase(PE). In present study, the methanol content reducing effects by using N-AIS was significant. On the other hands, the separation of juice and dreg by centrifugation can also attribute the similar effect. The combination utilization of both the addition of N-AIS and the separation of juice and dreg can reduce the methanol content up to about 65%. However, the organoleptic characteristics were worse with utilization of separation of juice and dreg. Comparing to the untreated group and centrifuged group, wine by N-AIS group exhibited higher pH value and greater brownness. The trend of methanol content and clarity increased along with fermentation.. The titratable acid and clarity were the relatively greater and brownness and soluble protein content were the relatively lower in centrifuged group.. During the storage after fermentation, all of experimental groups and control groups exhibit no observed difference in pH value, methanol content and soluble solid content. Collectively, both the addition of N-AIS or AIS and the separation of juice and dreg can obviously reduce the methanol content in wine fermentation.

Food Safety

Awareness of hydatidosis among northern Portuguese sheep farmers and its impact in Public Health

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About 61% of the infectious species known as human pathogens are classified as zoonotic. The anthropogenic changes of the biosphere are causing environmental damage, which favour the emergence of zoonosis locally, but international trade, transportation and migration of animals and humans, make them spread globally. According to the World Health Organization, nearly 2 billion people worldwide are infected with soil-transmitted helminthes. *Echinococcus* spp. are cestoda that live in the small intestine of dogs, causing echinococcosis. Their eggs are discharged with the faeces and can be ingested by ungulates or humans. The development of disease caused by larval forms (cysts) in intermediate hosts is known as hydatidosis, an important zoonotic disease that causes high morbility and mortality in humans, is hyperendemic in the Mediterranean region, and in Portugal, only at Oporto Delegacy of the National Health Institute Dr. Ricardo Jorge, 30 to 40 new human cases are identified each year. Six different *Echinococcus* species are known, but the most important is *E. granulosus*. To date, 10 different *E. granulosus* genotypes (G1-G10) have been identified. The presence of G1 (sheep strain), coincides with the high prevalence of human hydatidosis in the same region, so the communities involved in raising sheep should be a priority setting. *E. granulosus* occurs worldwide wherever there are certain socio-cultural practices, and lack of knowledge about the disease by humans, allowing the perpetuation of this zoonosis. The development of strategies to inform the community of the risk and prevention measures should be based not only on the results of scientific research of risk factors, but also in analyzing the perception of the problem by the community. The aim of this study was to identify the awareness of the sheep farmers about hydatidosis in Minho region. For this purpose 163 farmers were questioned about their knowledge and practices relating to hydatidosis prevention using questionnaire surveys made of multiple choice questions. Most of the farmers (77,30%) were more than 50 years old, and they have an average of 10 sheeps, 3 goats and 2 dogs. One hundred and nine farmers (66,87%) admitted to slaughter animals at home, but only 4 (2,45%) reported having seen cysts in their viscera. These farmers mostly bury (56,88%) or feed the dog (26,60%) with the viscera.

Seventy seven (47,24%) farmers said to promoted the deworming of their dogs, but only once a year (71,43%), besides, just 7 (9,09%) knew with what dewormer. In eighty three (50,92%) farms, there is a full contact between farm animals and dogs. One hundred and fifty eight (96,93%) farmers have never heard about hydatidosis. One hundred and seven (65,64%) farmers refer they would like to get information about the disease, and they would rather prefer to get it by the veterinary (66,36%), flyers and the family doctor. It appears that a plan is required to raise awareness amongst sheep farmers. Veterinarians may have an important role in sharing relevant information on zoonosis in general and hydatidosis in particular, actively contributing to the motto " Veterinary sciences for one health".

Octopus species: mineral characterization, intake and potential health risks associated with their consumption

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Octopus species are assuming a growing importance in economic terms and constitute one of the preferred cephalopods species of the Portuguese population. The concentration of minerals in seafood is influenced by a number of conditions such as biological differences (species, size, age, gender, and sexual maturity), nourishment source, environment (water chemistry, salinity, temperature, and contaminants) and seasonal factors. Several organizations, such as the World Health Organization and the Environmental Protection Agency (US EPA) have made recommendations regarding advisable mineral amounts of a daily human exposure establishing Dietary Reference Intakes and the potential health risks when minerals are consumed above the Tolerable Upper Intake levels . Attention has been focused on mineral determination in seafood due to the nutritional benefits of essential elements and toxicological concerns related to anthropogenic influx of contaminants .

In this study, muscles of several octopus species, originated from different geographical regions (Northeast Atlantic Ocean, Eastern Central Atlantic Ocean, Western Central Atlantic Ocean, Pacific Ocean and Mediterranean sea), were analyzed by high resolution continuum source flame and graphite furnace atomic absorption spectrometry for their contents in several essential and non-essential minerals. Sample collection and preparation were performed according to EPA Guide No. 823-B-00-07 and EC Regulation No. 333/2007. Health risks to human *via* dietary intake were assessed by comparison with the tolerable limits considered by European Commission Regulation and Agriculture Organization/World Health Organization (FAO/WHO) and by the estimation of target hazard quotients and target carcinogenic risks for several age-groups taking into consideration the world and Portuguese *per capita* cephalopods consumption. The obtained results suggested that *Octopus vulgaris* must be eaten in moderation due to possible hazard and carcinogenic risks derived from arsenic ingestion.

Food Safety

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Nutritional value of seeds of four *Cucurbita* species in center Chaco region, Argentina.

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Cucurbita seeds are used since ancient times for its nutritional and medicinal properties, but standard analysis of its chemical composition and nutritional attributes are unavailable in our region. With this in mind, we compared four "pumpkin" seeds varieties, Tetsukabuto (hybrid *C.moschata* and *C. maxima* Duchesne ex Lam.), *C. mixed* Pangalo (striped pumpkin), *C. moschata* (Duchesne ex Lam.) Duchesne ex Poir. (coreanito) and *C. maxima* Duchesne (pumpkin lead).

The moisture content was determined by drying in an oven at 105 ºC, ash by incinerating in a furnace at 550 ºC and insoluble substances by hydrochloric acid contents (AOAC, 1990). Results obtained in the determination of these parameters were: moisture content ranged between 4,69 ±0,25 to 7,10 ±0,74 % (g/100 g f. w.), ash values ranged from 3,23 ±0,2 to 5,02 ±0,689 % and insoluble substances were from 0,19 ±0,04 to 0,49 ±0,10 %, expressed in grams per 100 grams of dry weight (g/100 g d. w.)

A proximal analysis indicated that protein and fat contents were the main components in dry seeds. Oil content was determined by continuous extraction in a Butt apparatus using hexane as solvent; oil values were significantly different *(p< 0,05)* among seed types and ranged from 30,4 ± 0,8% to 40,8 ± 2,5 % d. w. Refraction index values ranged from 1,461± 0,01 to 1,470± 0,01, all of them measured at 29ºC using a refractometer Abbe 2WAJ. Oil was physically and chemically stable, didn't show signs of rancidity and showed optimal organoleptic properties of edible oil, with fat saturated acids that oscillate between 16,63% and 25,0% and unsaturated between 38.8% and 52.39%. In the lasts one we can highlight: palmitic C16:0 (13.04 – 15.30%); stearic C18:0 (6.49 – 9.81%); n9 oleic C18:2 (27.16 – 38.30%); linolenic C18:2 (.37.84- 52,59 %) and arachidic C20:0 (0.53 – 0.78%).

The proteins were evaluated by Lowry's method throwing, results were significantly different among seed varieties and ranged from 29.79 ± 0,66 to 39,56 ± 078 % d. w. Crude fiber, determined by sequential hot digestion of the defatted samples with dilute acid and alkaline solution, varied significantly among seeds. Carbohydrates determination was done by Dubois method (phenol/sulfuric), carbohydrates contents was not significantly different among seeds and ranged from 5,91 ± 0,94 to 7,15 ± 0,71 % d. w. Energy levels, analyzed with a calorimetric adiabatic bomb (Mod. PARR 1.261), were from 431.9 ± 7.2 to 582.6 ± 9.0 Kcal/100gr dry matter.

A high nutritional value of the seeds was determined taking into account the studied species. *C. pangalo* seeds showed the highest oil content, *C. moschata* showed the highest carbohydrates while the*Tetsukabuto* the highest amount of proteins. Pumpkin seeds can thus be considered as sources of proteins and oil. Further work may be needed for the evaluation of their protein composition and functional properties.

In vitro effect of temperature and cobalt chloride treatment on human red blood cells and RBC suspensions

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Cobalt chloride ($CoCl_2$) is a water soluble compound known to improve hematological parameters. Recent data show that athletes use the salt to stimulate endogenous erythropoietin production, thus erythropoiesis. No significant morphological changes are observed when erythrocytes are exposed *in vitro* to 42°C. Changes in the hemorheological and hematological parameters induced by exposure of blood to varying degrees of temperature are poorly studied.

The aim of the present study was to investigate the *in vitro* effect of $CoCl_2$ treatment on erythrocyte morphology, some erythrocyte indices and rheological properties of RBC suspensions after incubation at different temperatures.

Human erythrocytes (RBC) were washed in 0.9% NaCl, hematocrit was adjusted to 40% and treated with 50 µM or 500 µM $CoCl_2$x $6H_2O$. The RBC suspensions were incubated for one hour at 4°C, room temperature and 40°C. After incubation the apparent viscosity of RBC suspensions was measured with a rotational viscometer Contraves Low Shear 30 over a wide shear rate range at 37°C. The morphological changes were studied on blood smears stained with May-Grünwald-Giemsa and observed on a light microscope. Erythrocyte indices such as hematocrit (Hct), mean corpuscular volume (MCV), red blood cell distribution width (RDW) were obtained using automated hematological analyzer.

Food Safety

Preliminary results showed that RBC rheological properties were changed after incubation at various temperatures and morphological alterations were detected when different $CoCl_2$ concentrations were added. Data from the control samples indicated that the apparent RBC suspensions' viscosity is temperature dependent. Viscosity was significantly elevated in samples incubated at 4°C compared to that of room temperature and 40°C. Treatment with 50 µM and incubation at room temperature increased significantly the apparent viscosity of RBC suspensions. On the other hand viscosity was significantly decreased in the presence of 50 µM or 500 µM $CoCl_2$ when the samples were incubated at 40°C. Thermal treatment induced anisocytosis leading to increased RDW and decreased MCV. The highest RDW values were measured at 40°C. Addition of $CoCl_2$ increased MCV in samples incubated at 4°C or 40°C. Morphological studies showed RBC aggregates at 4ºC while elyptocytes were mainly observed at 40°C.

Incubation at different temperatures and treatment with $CoCl_2$ did not affect Hct values of RBC suspensions compared to the control samples. Dose-dependent effect was not observed.

The effect of $CoCl_2$ on RBC hemorheology is temperature dependent. At high temperature $CoCl_2$ decreases the apparent viscosity of RBC suspensions while at low temperature it elevates viscosity. The effect of the compound is significant at room temperature therefore the temperature is an important factor and should be considered when $CoCl_2$ solutions are used for treatment.

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Food Safety: schools assessment in Seixal

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This study aimed to assess the level of non-compliance of food safety minimum requirements in public schools canteens - where one of the most sensitive population groups is served - encompassing Elementary Schools (EB1), Junior High Schools (EB2,3) and High schools (ES) of a Portuguese municipal region - Seixal.

A form created by Direcção Geral de Saúde (DGS) was used by a local public health service and applied to assess the hygiene and health conditions of collective food areas. The data presented was collected during visits to schools in 2008/2009 and 2010/2011.

The results revealed several issues, at structure and functioning levels, especially on EB1, which responsibility for building maintenance and management of food services is affected to the city council, in opposition to EB2,3 and ES which management is allocated to the Ministry of Education. The age of the buildings and the low number of food handlers in relation to the average of meals served, were identified as two possible factors involved in the weakest results obtained by EB1. Despite the poor results of the 2008/2009 assessment, a general worsening situation was observed during 2010/2011, which underlines the need for measures leading to the solution of the detected problems.

There is the need of a real commitment of schools governing members, to invest in structural adjustments and maintenance, and in a better food handlers training and an effective supervision of good practices implementation.

Exposure risks to carcinogens in food: formation of heterocyclic aromatic amines (HAs) and polycyclic aromatic hydrocarbons (PAHs) in grilled muscle foods

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Diet contains almost all the necessary ingredients to support the human life. However, chemicals that had a deleterious effect may also be present. Such chemicals can occur naturally in the food, others are synthetic and some are produced during cooking. Cooking toxicants have been receiving special attention in the last decades concerning their formation, occurrence, mitigation, and the impact on human health. The risk of exposure to these compounds depends on the kind of diet, eating habits and cooking practices.

Grilling muscle foods involves high temperatures that lead to production of cooking toxicants, such as heterocyclic aromatic amines (HAs) and polycyclic aromatic hydrocarbons (PAHs). High PAHs and HAs contents in food is usually found in charcoal grilled/barbecued foods through the pyrolysis of fat and smoke from heat source. As so, there is an urgent need to study these two groups of mutagens in the same samples. HAs and PAHs were quantified in well-done meat and fish samples.

Food Safety

Quantitative HAs and PAHs profiles were different for beef and salmon using the same type of charcoal. Higher levels of HAs and PAHs were found in salmon samples. Since beef and salmon were grilled in the same way, we believe that the higher amount of PAHs in salmon may be a function of their fat content. Chicken grilled in the charcoal, contained PhIP, 4,8-DiMeIQx, Trp-P-1, AαC, MeAαC, and all PAHs except DhA. PhIP formation was higher than other HAs in chicken samples. Continuous barbecuing with the same charcoal shown that combustion of fat that dropped along the grilling period contributed to higher formation of HAs and PAHs. Salmon and chicken contribute to total HAs exposure with similar amount around 1500 ng/100 g. Salmon exhibited the highest amount of PAHs, followed by chicken and much lower amount was quantified in beef.

Special attention must be given to the intake of barbecued foods since high amounts of HAs and PAHs can be taken in a single meal. Changes in cooking practices can improve the overall reduction of PAHs and HAs content in these types of food.

Food Hygiene and Safety Project: step by step… towards food safety

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Promote and ensure food hygiene and safety nowadays requirement any institution that prepares or distributes food, as a way protecting consumers' health.

Foodborne diseases are a major concern level Public Health, mainly because they can affect the most vulnerable groups such as children, elderly and people with special needs.In this sense, is progress, since January 2011 and until December 2013, "Food Hygiene and Safety Project: step by step… towards food safety", developed in the County of Condeixa-a-Nova and with participation several institutions namely college of Health Technology Coimbra, Department of Environmental Health, City Council of Condeixa-a-Nova and Health Centers Groupings of Baixo Mondego I.

This project has its target population canteens/cafeterias from public and private schools and from public and private institutions social solidarity of county. This group consists 3 nursing homes, 5 day centers, 4 nursery schools, 10 kindergartens, 8 elementary schools the 1st cycle, an elementary school the 2nd and 3rd cycles, a secondary school, 2 Private Institutions Social Solidarity, Temporary Service Center, all with areas food preparation/cooking and/or distribution, with their respective food handlers, managers and professionals responsible developing menus.

Food Safety

The objectives project improvement structural and operating conditions, acquisition knowledge food handlers, critical proper food handling, cooking and distribution, acquisition skills for the preparation menus and cooking healthy meals, appropriate different group ages. Although project still development, we present some preliminary results:

- It was made an evaluation quality frying oils all locations where food fried, by measuring polar compounds. The obtained results ranged between 1% and 9.5%, which indicates a good quality.

- Temperatures food were measured upon arrival cafeterias (not cooked) and when leaving the cooking locations, before delivery. The temperature soup varied 72°C to 90°C and the temperature second course ranged between 44ºC and 81°C, therefore it was verified there are some foods the danger zone.

- Some visits / inspections all institutions were already made and the implementation HACCP was evaluated. Various registrations are made in institutions/schools that prepare their own food, and were detected failures with regard traceability, analysis food, water, etc., and the presence Safety Data Sheets on chemicals. In these places, it can be said that the issues regarding the hygiene facilities and utensils would improve with the existence of larger number of human resources.

Most school cafeterias (without cooking) present poor installation conditions, since these are activity rooms where meals are also served. It was further verified that HACCP essentially comes down to the temperature measurement meals.

- All establishments have public water supply and/or private boreholes. In this latter event, water is subject of disinfection and periodic analysis.

- It was verified that only 5 institutions are supported dietitian in the preparation of menus.

- 15 training sessions covering 105 professionals have already been held and is also in progress elaboration manual of good practice. The goal develop remaining activities until the terminus of the planned time frame.

At the end the project it's intended to produce an article stating various stages its development and their respective assessment.

Aflatoxins and ochratoxin A in baby foods and analysis of interactive cyto- and genotoxic effects in a human intestinal cell line

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Mycotoxins are natural fungal metabolites and food contaminants with potential to cause severe acute and chronic conditions. Food contamination with mycotoxins such as aflatoxins (AF) and ochratoxin A (OTA) have been causing great concern, especially due to their potential mutagenic and carcinogenic effects. Children are especially vulnerable to the deleterious effects of these mycotoxins due to their physiological immaturity and high metabolic rate. Previous studies showed the co-occurrence of low concentrations of aflatoxins and OTA in baby foods. However, studies addressing potential interactive cyto- and genotoxic effects between these toxins are still scarce. In the present study we aimed to develop and validate a method for detection and quantification of total aflatoxins (B_1, B_2, G_1, G_2), AFM_1 and OTA, and to evaluate the cytotoxic and genotoxic effects of mixtures of AFM_1 and OTA, comparatively to their individual effects, in a human-derived intestinal cell line.

A method based on immunoaffinity column cleanup and High Performance Liquid Chromatography with fluorescence detection (HPLC-FD), was applied and validated for total aflatoxins, AFM_1 and OTA. The method was adequate for the analysis of these mycotoxins in baby foods and met the requirements of validation and quality control. The application of the method to a small set of baby foods marketed in Portugal showed an absence of quantifiable amounts of these mycotoxins.

The individual and combined cytotoxic and genotoxic effects of AFM_1 and OTA were characterized in Caco-2 cells using the Neutral Red and the Comet assays, respectively. A dose-dependent cytotoxicity was observed after individual exposure to OTA and AFM_1, and the IC_{50} values were determined. The cytotoxic effect observed for several AFM_1 and OTA mixtures was compared to the expected effect predicted by concentration addition (CA) and independent action (IA) conceptual models, using the MIXTOX model. A preliminary approach regarding the total data pool and considering the CA model as the most conservative model, pointed to an antagonistic cytotoxic effect caused by the mixture of both mycotoxins. However, a dose level deviation was observed after IA modelling, reflecting antagonism at low dose levels and synergism at higher dose levels. To better support data modelling, further cytotoxicity results from mixtures will be obtained and analyzed.

Food Safety

To which respects the genotoxic effects, no induction of DNA damage was observed for the tested low doses, neither for individual toxins nor for their mixtures.

The present study reinforces the relevance of exploring possible interactive adverse effects of mycotoxins that can contaminate foodstuff and thus having impact in human health. Future studies will face the challenge of understanding the mode of action of such mycotoxins when in mixture, in order to try predicting their effects.

Sanitary conditions and microbiological quality of ready-to-eat food in street food vending – preliminary survey

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Street food vending had a significant growth during the past few decades due to strategically location, close to the consumer, presenting readily available and inexpensive nutritional meals. Nevertheless, conditions under which street vendors operate are usually unsuitable for the preparation, storage and maintenance of food at safe temperatures and hygienic conditions. For instance, food available may be subject to air pollution (dust), long holding times at ambient temperatures and cross contamination by insects and rodents attracted and harbored by waste in the streets. Considering these factors, street food vending can be of particular concern with regard to the occurrence of food poisoning due to potential contamination with pathogenic microorganisms. Furthermore, the information on the microbiological quality and safety of street-vended foods are absent. The present work aims to evaluate the sanitary conditions of street food vending facilities and evaluate microbiological quality of ready-to-eat food available in street food vending.

This study was carried out in nine randomly selected vendors where were acquired 10 snacks (hot dogs, hamburgers, wrapped and beef sandwich) for the detection and identification of mesophilic microorganisms (37ºC), Enterobacteriaceae and *Staphylococcus* spp. Food samples were classified according microbiological criteria proposed by the National Institute of Health Dr. Ricardo Jorge (INSA, Portugal) and by the Irish Food Safety Authority. A *checklist,* comprised the fields: general setup, hygiene conditions and personal hygiene of the food handlers, was used to characterize structural and functional conditions.

For the sanitary conditions about 67% of establishments were classified as sufficient, based on clean surrounding area, conservation status of the walls and ceilings, appropriate work clothing and proper washing of hands. High numbers of mesophilic microorganisms were found, being 70% of food samples classified as unsatisfactory. The same classification was assigned for the presence of Enterobacteriaceae, being identified *Klebsiella pneumoniae* and *Enterobacter cloacae*. In the survey of *Staphylococcus* spp. were identified *Staphylococcus epidermidis*, *Staphylococcus hominis*, *Staphylococcus xylosus*.

Food Safety

Results seem to indicate that food available in street food vending, particularly those who have in its constitution raw materials, namely lettuce, onion, carrot and olives can present risk to human health. The beef sandwich presented lower microbiological contamination, probably due to efficacy of thermal process. It was verified the need to develop training programs under the Food Safety and Hygiene, to avoid cross contamination and recontamination of cooked products. Efforts should be made by health authorities to maintain regular inspections, as well as to monitor the microbiological quality of food available in street food vendors.

Food Safety in the basic schools and kindergartens

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Food Safety is nowadays a pressing matter, relating directly with the adopt life style by modern society which tends to rely on making meals outside of their houses. This way, these sort of service providers assume a high responsibility role to consumers, making it necessary to exist a group of procedures which guarantee the non contamination of food.

Around one third of the population in the developed countries suffers annually of diseases provoked by unsafe food ingestion. In various countries, during the last two decades, it were identified as an important and pressing economic and public health problem.

The objective of this study as centered in the food safety assessment at basic schools and kindergartens in the Center region of Portugal. This way it was assessed the compliance with structural requirements and hygienic and sanitarian conditions of cooking places and canteens, as well as, food packaging temperatures, microbiological contamination of food and microbiological contamination of surfaces.

This research paper refers to a level II study, descriptive-co relational and transversal nature. The statistical tests interpretation was done with a p=0,05 significance level and a confidence range of 95%. 81 places were assessed, from which 10 refer to cooking places and the others canteens.

Concerning the compliance with studied canteens infrastructure on physical and environmental requirements, it only registers an average of 61% (±8,32) of legal requisites compliance. Relatively to the applicable requisites to food handlers, we obtained an compliance average of 76% (±26,84). When we assess the requisites to equipments and tools, it was noted that only 64% (±12,29) of the requirements are met.

Specifically in relation of place of washing hands of food handlers, it was observed a average percentage of legal requirements of only 83% (±25,66).

Regarding meal packaging temperature, we obtained an average temperature of 59,54ºC (±11,02), which revealed the existence of a statistically significant mean difference in relation to the reference value of 65ºC (p <0,000).

In relation to the microbiological contamination of handler's hands, it was observed the existence of a statistical significant correlation between the non compliance of physical conditions of hand washing place and the microbiological load of handler's hands (p <0,05).

Relatively to microbiological contamination of foods and surfaces (microorganisms at 30ºC), it weren't observed any statistical significant differences between the obtained values and the maximum allowed. It wasn't observed any cases of contamination by *Escherichia coli, Estaficocos coagulase positive, Listeria monocytogenes* neither *Salmonella spp*.

Evaluation of knowledge, attitude and practice related to hygiene and food safety in catering enterprises

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Food poisoning, or in other words the diseases transmitted by ingestion of contaminated food, is due to, among other factors, the contamination of food by food handlers. This study aimed to evaluate the Knowledge, Attitude and Practice on food hygiene and safety, of food handlers working in companies providing catering services.

A level II study, of survey type and transversal nature, was applied to companies providing catering services from the municipality of Oliveira do Bairro, Aveiro district, with a target population of 3 companies and 42 food handlers working in those companies. The sampling was of non-probabilistic type and of convenience technique. Data collection took place in August and September 2011, through the delivery of surveys to food handlers.

This study showed that the level of Knowledge and Attitudes of food handlers on food hygiene and safety have proved to be good. However, the results regarding the Practice were very low. It was also verified that the training received affected the level of Knowledge, Attitude and Practice of food handlers and that the best results in terms of Practice were the ones from food handlers who received more training. As for food handlers with more years of service, they obtained better results at the level of Knowledge. Knowledge, Attitude and Practice showed a correlation, however, this correlation was more evident between Knowledge and Attitude, which demonstrates that the level of Knowledge strongly influences Attitude regarding food hygiene and safety.

The results of this study reflect the importance of training and information on the acquisition and consolidation of knowledge, since it was demonstrated the existing relationship both between received training and knowledge and between Knowledge, Attitude and Practice on food hygiene and safety of food handlers.

Food Safety

Qualitative risk analysis of chemical food hazards for a traditional distilled beverage Aguardente de Medronho

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Aguardente de Medronho is a traditional beverage at the south of Portugal with different uses in the local population diet. As a distilled beverage obtained from the fermentation of *Arbutus unedo´*s fruits (Mediterranean shrub), chemical hazards need to be addressed in order to guarantee product safety. A qualitative risk analysis for ethanal, copper and furfural compounds was performed during the HACCP study for a traditional process to assist the critical control points (CCP's) determination. Adverse health effects associated to the chemical hazards were classified with a four categorical severity scale, ranging from serious for general population (1) to moderate (4). Together with frequency, rated also in a four class scale from very high (1) to very low (4), a qualitative risk for each step where hazards were identified was obtained through a matrix risk, ranging from negligible to critical.

Ethanal may be present at harvest due to poor fruit ripening and also from stems and leaves contamination. At distillation step, hazard level may be reduced to the considered safety level (5 g/hl in 100 vol % alcohol) with evaporation before adding initial rejected distilled fraction from previous distillations (*cabeça*). Ethanal as a carcinogen source was classified with maximum severity (serious for majority of population). Frequency was rated as infrequent both for harvest and distillation steps, and therefore ethanal risk was rated as medium.

Copper contamination may take place during distillation stage due to still construction. Control measures for this hazard are discard distillate first fraction (5%), adequate equipment coil cleaning and stainless steel head for copper stills. As copper health severity was classified serious (3) and preventive measures caused this hazard infrequent (4), there is a low risk for copper at concentrations higher than 15 mg/l.

As furfural compounds may be formed due to excessive heating during distillation which burns fruit fermented mass, temperature control is vital prevent this hazard. Hazard severity was classified as serious (3) with low frequency (3), as furfural compounds may be associated to dermatitis and respiratory tract irritation. Therefore, the risk of furfural compounds with level above 5 mg.100 ml^{-1} anhydrous alcohol was low.

In conclusion, risk order for the chemical hazards studied was ethanal>copper>furfural compounds, which will contribute to a more focused CCP's determination and therefore a more effective HACCP plan.

Food Safety

Hazard analysis during concept design of a plant based food supplement: case study on sweet potato leave

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Due to its availability, medicinal and health-promoting properties, sweet potato leaves (SPL) are communally used in in Asian and African countries. Despite increasing research studies on SPL biological value, it is still neglected in the diet of Western nations. The reported consumption of SPL in salads, soups or simply sautéed at the south of Iberia Peninsula in 1940's had not pass to succeeding generations. Health benefits as cardioprotective and chemopreventive functions associated to SPL were related to its polyphenolic content.

Phenolic compounds are secondary metabolites that protect plant tissues against injuries and have been demonstrated to reduce cancer risks, blood glucose and/or plasma cholesterol. SPL may be considered a functional food *per se* or source for food supplements. According to the European Union legislation definition for this category of products, it is a concentrated source of nutrients or other substances with a nutritional or physiological effect, alone or in combination, marketed in dose form designed to be taken in measured small unit quantities with the purpose is to supplement the normal diet. It was within the upward trend with predicted continuous growth for the supplements market that the ideation of a SPL based food supplement arrived.

Food Safety

A Hazard Analysis and Critical Control Points (HACCP) approach was used during concept design of a dietary supplement from SPL to evaluate food safety. Although polyphenols are listed as ingredients for foods for specified health uses it was considered that some health claims advertisements were excessive for the available scientific evidence. Biological properties of polyphenols depend on the amount consumed and on their bioavailability. Daily dietary allowances are usually established as a guideline on the optimal dose range to avoid deficiency and prevent toxicity. As polyphenols are not required for growth and development, the lifespan essential concept was used. Lifespan essential concept applies for compounds that reduce the incidence of chronic, age-related diseases due to the increase of both the chance of reaching the full genetically determined lifespan and the quality of life during aging.

Toxicological issues related to plant active ingredients – polyphenols and environmental contaminants – as pesticides residues – were addressed. Assessment of polyphenols contribution to dietary allowances for optimal health was performed considering a lifespan essential target intake value. Potential effects associated linked to antinutritional factors and drugs interactions were integrated in the conceptual assessment. Polyphenols are also considered antinutrients as they may chelate iron reducing its absorption in the human gut.

In addition, interference with absorption, tissue distribution, metabolism and excretion of drugs are possible negative interactions.

Base on published scientific literature, control measures for the identified hazards were listed. Integration of food safety during concept design allowed the identification, prevention and control of toxicological issues related to SPL as dietary supplement. Hazards analysis contributed to a better definition of the supplement during concept design which provided guidelines for higher focus on quality and safety during the new product development process.

Total concentrations of essential metals Ca, Cu, Fe, Mg, K, Na and Zn in goat's and cow's pasteurized milk consumed in the city of Maracaibo (Venezuela) determined spectrophotometrically

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Milk is an important nutrient source for the human diet, which is composed of fat, protein, vitamins, enzymes, sugars and inorganic elements essential for the proper development of the human body's vital processes, so it is consumed by people of all ages. Cow's milk (CM) ranks first in production and consumption nationwide. However, goat milk (GM) is an alternative to cow's milk in some respects very beneficial for human consumption, based on its easy digestibility for patients who can not tolerate cow's milk protein allergy or by the size of their fat globules. In this sense, it is necessary to carry out studies to know with greater certainty that there are advantages from the nutritional point of view of a type of milk over the other. In this paper, it was presented the total concentrations of Ca, Cu, Fe, Mg, K, Na and Zn in samples of pasteurized milk of goat and cow consumed in the city of Maracaibo, using the instrumental techniques of flame atomic and emission absorption spectrometries (FAAS and FAES, respectively). It conducted a random sampling, where samples were collected from liquid milk of goat and cow (n = 35 each one) of commercial presentations of 1/2 and 1 liter of different brands. The samples were digested with HNO3/H2O2 at atmospheric pressure, in order to remove organic matter. Mean precision of the methods (expressed as RSD) was 1.46%; the accuracy of the methods was evaluated by recovery studies, obtaining average recoveries for all metals of 100 ± 5%; and the limits of detection (LOD = 3□/m) obtained were 0.027, 0.024, 0.042, 0.005, 0.002, 0.002 and 0.008 mg/L for Ca, Cu, Fe, Mg, K, Na and Zn, respectively; thus, the methods developed were accurate, precise and free from interference. The concentrations obtained were: 845.9 and 1069.3 mg Ca/L, 0.326 and 0.445 mg Fe/L, 113.02 and 97.20 mg Mg/L, 2390.7 and 1762.8 mg K/L, 656.6 and 904.8 mg Na/L, and 1.85 and 2.29 mg Zn/L, for CM and GM, respectively. Copper concentrations were undetectable in the samples analyzed. Essential metal concentrations found in the types of milk studied were inside of accepted intervals of nutrients and, in consequence, they can be employed like nutritional sources of Ca, Fe, Mg, K, Na and Zn for Venezuelan kids and adults.

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Food Safety

Cocoa in danger

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People have always valued cocoa - indispensable ingredient of a chocolate - and so it is today. Each year around the world people spend on this delicacy more than 90 billion dollars. What more, global population is raising and more and more The Third World's habitants can afford a chocolate. Demand for this tidbit may exceed supply soon.

Theobroma cacao (cocoa) is exposed to many dangers. This tree has always been extremely vulnerable to pests and infections caused by fungi. The matter worse by the fact that many farmers, especially those living in African countries, do not have easy access to the best seeds, fertilizers and fungicides.

Another problem is cocoa cultivation. Cocoa tree comes from mountainous regions of Amazonia (today's Ecuador). Today this tree grows only in a narrow area lying north and south of the equator (limited by $+9^{o}$ and -9^{o} parallels). Cacao prefers fertile, well permeable soils, which are rare in the tropics. Also requires heat and humidity - conditions conducive to pests and fungal and viral infections. Additionally to the threat posed by fungi *Moniliophthora roreri* and *M. perniciosa*, cocoa tree is in danger because of virus CSSV (cocoa swollen shoot virus) in West Africa, and moth *Conopomorpha cramerella* in south - east Asia - the latter causes crops lossess estimated at 600 million dolars per year. Cocoa in Ghana suffer from damage caused by insects, fungi and viruses. Experts are afraid that a plague has already reached the neighboring Ivory Coast. Even if the disaster does not occur, it will be hard to cope with still raising demand for cocoa seeds: current production was estimated at about 3,7 million tons per year, while demand in 2020 will reach 4 million tons.

Food Safety

There are some possible solutions, which can help save endangered cocoa cultivations in whole tropical area:

- More resistant trees – by knowing the genome sequence of cacao, the gene variant resistant to the fungus *M. roreri* was identified. Farmers vaccinate their tree with resistant varieties.
- Mixed agroforestry systems – cocoa cultivation with edible, forage and fuel plants improve water retention, by varying the types of root systems.
- Give a hand - the aim is to educate farmers, promote crops diversification and improve supply chain efficiency.

Integrated pests control methods - some farmers in addition to pesticides – which cause loss of biodiversity – are using alternative methods of crops protection, for example natural enemies of *C. cramerella*.

Spectrometric total concentrations of Ca, Cu, Fe, Mg, K, Na and Zn in human milk as bioindicators on the nutritional quality in newborns

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Human milk is a biological fluid, which provides the essentials nutrients for the development and growth of newborn children during the first months of life; also, it contains enzymes, specific proteins, nucleotides, metals, etc. As essential nutrients, many chemicals can be transferred from body storage sites and the blood of nursing mothers to breast milk. Nowadays, research on the importance of essential trace metals in human milk, its nutritional quality and its relation with environmental factors are growing. In this work, it is presented the total concentrations of Ca, Cu, Fe, Mg, K, Na and Zn in samples in human milk using FAAS and FAES. The samples were collected from breastfeeding women between 2 and 8 post-partum months. For destruction of organic material, digestion of the real samples with HNO_3 / H_2O_2, both concentrated, was applied. The total metals concentrations were: 303.26 mg L^{-1} of Ca; 0.467mg L^{-1} of Cu; 1.749 mg L^{-1} of Fe; 31.541 mg L^{-1} of Mg; 674.534 mg L^{-1} of K; 1311.27 mg L^{-1} of Na and 3.511 mg L^{-1} of Zn. The limits of detection (LD=3σ/m) obtained were 0,051; 0,056; 0,073; 0,006; 0,003; 0,003 and 0,009 for Ca, Cu, Fe, Mg, K, Na and Zn, respectively. The precision (expressed as RDS) was ≤ 5%. Accuracy was assessed by recovery studies, obtaining mean recoveries percentages of 100±5%. Developed methods for the determination of total concentrations of the studied metals were accuracy, precise and free from interferences.

Food Safety

Effects of gamma radiation on raspberries: safety and quality issues

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There is an ever-increasing demand from consumers all over the world for high quality foods, with major emphasis placed on quality and safety attributes. One of the main demands that consumers have is for minimally processed, high nutrition/low energy natural foods with no or minimal chemical preservatives. The nutritional value of raspberry fruit is widely recognized. Red raspberries, in particular, are known to demonstrate strong antioxidant capacity that could be beneficial to human health to prevent free radical-induced oxidative stress. However, food products, that are consumed raw, are increasingly being recognized as important vehicles for transmission of human pathogens. Food irradiation is one of the few technologies which address both food quality and safety by virtue of its ability to control spoilage and foodborne pathogenic microorganisms without significantly affecting sensory or other organoleptic attributes of the food. Food irradiation is well established as a physical, non-thermal treatment (cold-pasteurization) that processes foods at or nearly at ambient temperature in the final packaging, reducing the possibility of cross contamination until it is actually used by the consumer.

Food Safety

In this preliminary study it was intended to evaluate the gamma radiation effects on raspberries in order to assess the potentiality of irradiation as a treatment process. Based on that, fresh packed raspberries (*Rubus idaeus* L.) were irradiated in a Co-60 source at several doses (0.5; 1 and 1.5 kGy). Bioburden, total phenolic content, antioxidant activity, physico-chemical (texture, color, pH, soluble solids content and acidity) and sensorial parameters were assessed before and after irradiation and during storage time (up to 14 days at 4ºC).

The characterization of raspberries microbiota point out to an average bioburden value of 10^4 cfu/g and to a diverse microbial population predominantly composed by two morphological types [gram-negative, oxidase-negative rods (34%) and filamentous fungi (41%)]. The inactivation studies on the raspberries mesophilic population indicated a one log reduction of microbial load (95% inactivation efficiency for 1.5 kGy), being the surviving population mainly constituted by filamentous fungi (79 – 98%).

The total phenolic content of raspberries, measured by the Folin-Ciocalteu method, indicated an increase with the radiation doses and a decrease with the storage time.

The same trend was verified for raspberries antioxidant capacity with storage time, as determined by the FRAP assay. Nevertheless, no significant difference was found between the antioxidant capacity of non-irradiated and 1.5 kGy irradiated raspberries. Regarding raspberries physico-chemical properties, irradiation caused a significant decrease in firmness compared with non-irradiated fruit. However, non-irradiated and irradiated fruit presented similar physico-chemical and sensory properties during storage time. Further studies are needed to elucidate the advantageous of irradiation as raspberries treatment process.

A intelligent monitoring system to improve indoor air quality in underground subway stations and tunnels

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Recently, platform screen door (PSD) has been installed in all of the subway stations in Seoul metropolitan areas to isolate platforms from tunnels. Due to this PSDs, air quality in subway platforms and waiting rooms has been improved compared to that before PSD installation. However, on the contrary, indoor air quality in tunnels has been considerably deteriorated.

In this study, an intelligent monitoring system was applied to underground subway stations and tunnels to improve the indoor air quality more efficiently. Measurements of PM_{10} and $PM_{2.5}$ concentrations were carried out at nine monitoring sites in D and H stations of the Seoul subway. The nine monitoring locations include three tunnels, two platforms, and two waiting rooms. Two sites outside the subway system were also monitored due to comparison reason. Measuring devices were connected to cable networks to facilitate central data collection and to monitor PM_{10} and $PM_{2.5}$ levels from the nine sites at the same time. In this work, ventilation fans were controlled by different monitoring concentrations between indoor and outdoor air quality. As a result, energy costs for ventilation in this subway stations and tunnels were decreased by 21% and 50% compared to ordinary operation conditions.

Indoor Air

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The study on the energy – saving rule-base operation under new developed comfortable conditions of the non-air-conditioning subway station

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The aims of this study are to develop the new comfortable conditions in the subway station without air-conditioning system and to develop new energy-saving rule-base operation method for the ventilation equipments by the new comfort conditions.

The much improvement of atmosphere in Seoul and installing the platform screen door in all of stations are main reasons to get better air quality than before.

To decide the acceptable air quantity to maintain the comfortable feeling of passengers, the frequency change with inverter system was used within the range of 60 Hz.

The experiment to get questionnaire was carried out twice in the two different stations to improve the reliability.

After analyzing the data by MINITAB, the result shows that there was no significant ($p<0.05$) difference in the comfort feelings in the range of 30 to 60 Hz, respectively. But there is statistically significant difference ($p<0.05$) between 0 Hz and 30 Hz, 40Hz, 50Hz, 60 Hz, respectively.

This new developed rule-base operation was applied to the D station, one of subway stations. As the results, the energy saved 38.4% and the air quality was almost same as or a little bit worse than before but kept below the environmental regulation limit.

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Photocatalytic degradation of indoor air pollution

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A bad indoor air quality is cause of health concern and building related illnesses. Omnipresent pollutants indoor buildings such microorganisms and volatile organic compounds (VOCs) need to be degradated to avoid illnesses caused by them, such asthma, allergies or SBS. Consequently, there is an increasing demand of a systematic control of the indoor pollutants and also for efficient air purification and disinfection systems.

Experiments performed with a laboratory-scale photoreactor proved that photocatalysis based on UVA-irradiated TiO_2 for the reduction of the concentration of bacteria in the air could compete with the conventional photolytic treatment with UVC radiation, more expensive and hazardous. Simultaneously to the disinfection, the concentration of volatile organic compounds was also reduced, which adds value to this technology for real applications. Therefore, these experiments prove that UVA-photocatalysis is a great advantage to treat the indoor air in buildings without a high cost.

The technology need to be adapted for being used in the photocatalytic unit of commercial air treatment devices. With this purpose, different TiO_2 photoactive materials were developed and deposited on aluminium supports for the simultaneous degradation of bacteria and VOCs. Materials were characterized by N_2 adsorption/desorption, SEM-EDX, contact angle and XRD. Their efficiency was tested at laboratory scale in the degradation of *Escherichia coli* (as model bacteria specie) and trichloroethylene (TCE, as a target VOC molecule). The bactericide activity was tested on *E.coli* under low intensity UV-A irradiation (0.7 mW cm^{-2}). Cell suspensions were diluted with to a final concentration of 10^6 CFU/mL. Aliquots of the culture were placed on sterilized Al-TiO_2 samples and controls prior to the irradiation. After the treatment, the samples were transferred into a sterile 2mL tube containing saline solution. This was then mixed using a vortex and serial dilutions were made. After being incubated, colonies forming units were counted. The inactivation of *E.coli* was attained within 90 minutes with TiO_2 materials and was observed not to occur within 9 hours in the dark. The photocatalytic performance for the degradation of TCE was evaluated in a continuous flow gas-phase flat photoreactor. The gas composition was monitored continuously with a FTIR spectrometer.

The influence of the TiO_2 loading was tested. The results show efficiencies around 80-100% except for the 1 layer sample. An increase of the TiO_2 content from 8.20% (1 layer) to 36.38% (5 layers) resulted in an increase of the TCE conversion around 60%.

To better understand the performance of this technology at real scale an experimental photoreactor has been designed. The system has been tested in an occupied room at CIEMAT facilities.

The survival of bacteria before and after the treatment was analyzed monitoring the air with a high-flow portable air impactor and subsequent colony counting. Identification of some of the samples was done by PCR. The VOCs concentration was followed with Tenax adsorbent. Quantification and identification of VOCs were done by ATD-GC-MS. The good results obtained for both bacteria and VOCs make this technology one of the most promising for the treatment of indoor air.

Could plants improve indoor air quality in schools?

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Sealed space habitats always represent an indoor air quality (IAQ) problem, mainly when the ventilation is inadequate to draw sufficient fresh air into the buildings. It has been shown that IAQ in school buildings is frequently worse than outdoors, which can adversely affect children's health, academic performance and attendance. Previous studies carried out by the National Aeronautics Space Administration (NASA) in sealed spaces indicated that plants and associated soil microorganisms can be used as a potential means of reducing levels of indoor air pollutants.

This study investigated the ability of plants to actually improve IAQ in schools. A nine-week intensive monitoring campaign of indoor and outdoor air pollution was carried out in 2011 in a primary school of Aveiro, Portugal. Measurements included comfort parameters (temperature, CO_2 and CO) and indoor and outdoor concentrations of volatile organic compounds (VOCs), carbonyls and particulate matter (PM_{10}) without and with plants in the classroom. PM_{10} samples were analysed and characterised for the water soluble inorganic ions (WSII), as well for the carbonaceous fractions in their main three components: organic carbon (OC), elemental carbon (EC) and carbonates (CC). Passive samplers for VOCs and carbonyls were used to obtain average concentrations over the week and during occupied periods, simultaneously. A strong correlation of the CO_2 levels with occupancy was observed.

The CO_2 levels greatly exceeded the acceptable maximum value of 1000 ppm defined by the Portuguese legislation, although the average concentration has decreased from 2004 to 1121 ppm after hanging 6 potted plants from the ceiling. High indoor CO_2 levels are normally considered as indicative of unacceptable ventilation ratios. The averages of total VOC concentrations in the indoor air during periods of occupancy without and with the presence of potted plants were, respectively, 933 and 249 μgm^{-3}. The outdoor average levels during the two corresponding periods were 142 and 150 μgm^{-3}, respectively. The daily PM_{10} levels in the classroom during the occupancy periods were always higher than those outdoors, suggesting that the physical activity of students and class works highly contributed to the emission and re-suspension of particles. The presence of potted plants likely favors a decrease of about 30% in PM_{10} concentrations.

CC, OC, EC and some soluble ions showed indoor/outdoor ratios above unity. A possible indoor source of EC in primary schools could be graphitic pencil largely used by children.

The indoor source of carbonate, calcium and potassium is chalk used in blackboards. This study suggests that new actions are warranted in schools to improve IAQ and to avoid toxicological effects. Our findings corroborate the results of NASA studies suggesting that plants can clean indoor air and make interior breathing spaces healthier.

VOCs and bioaerosols monitoring in an office of Madrid, Spain

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Air quality, temperature, relative humidity or air distribution are amongst the most relevant environmental factors that affect the comfort feeling of building occupants. Indoor Air Quality (IAQ) is impaired by the presence of toxic chemicals, particles and microbes. Health effects of a poor IAQ range from mild and acute to severe and chronic. Indeed, Volatile Organic Compounds (VOCs) emissions are amongst the most worrying chemical pollutants. Important indoor sources of VOCs are building materials, furnishing, cleaning products, solvents, deodorants and electronic devices. Nowadays, bioaerosols are also cause of health concern. Outdoor air, humans, animals, air-conditioning systems, humidifiers, textiles and dust particles, can be sources of microbes. Moreover, confined air may present an elevated microbial content.

An indoor air quality control is being done in an office located in Madrid city center. Samples are collected three days a week and one week per month. VOCs samples are collected during 24 hours using a sequential tube sampler (STS 25, Perkin-Elmer) and stainless steel tubes containing Tenax TA as adsorbent. Besides, temperature and relative humidity is measured. VOCs are desorbed and analyzed by means of an ATD (Turbo Matrix 650, Perkin-Elmer) connected to a GC/MS (6850 Network GC System/5973, network mass selective detector, Agilent). Fungi and bacteria are sampled during working hours and every two hours using two air impactors (DUO SAS SUPER 360, International PBI). After incubation, the colonies are counted and the concentration of the microorganisms in the air is expressed as CFU/m^3. Fungi colonies are isolated for identification based on the morphology of the colonies and their microscopic features. Bacteria identification is performed by molecular biology techniques (PCR and sequenciation).

In the winter months, during the hours of maximum occupation of the office, microorganism concentration reached a maximum of 20.000 CFU/m^3 for bacteria and 10500 CFU/m^3 for fungi.

The analysis of the indoor air fungal samples collected showed the presence of several species mainly of the genera *Penicillium, Cladosporium, Alternaria. Mucorals* and yeasts were also abundant. Some species of these genera are allergenic and even produce mycotoxins.

The chromatograms showed the presence of aromatic compunds, such as toluene and xylene, siloxanes (hexamethylcyclotrixiloxane, octamethylcyclotrixiloxane, decamethylcyclopentasiloxane or dodecamethylcyclohexaxiloxane) and aliphatic hidrocarbons such as tetradecane, pentadecane and hexadecane. Cyclic terpenes, particularly, α- pinene and *d*-limonene were also among the compounds detected.

Winter results showed higher numbers of bacterial and fungal CFU/m^3 in samples collected during hours and days with a greater number of people working in the office. In addition, there were differences in VOCs concentrations from one month to another and variations along the week and even along the day.

Effects of air ions in indoor environments on well-being, cognitive performance and cardiovascular parameters

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Since the beginning of the 20th century there is a scientific debate about the potential effects of air ions on biological tissues, wellbeing and health. Most studies indicate that a higher concentration of air ions and in particular negative air ions is beneficial for health and wellbeing. In an experimental indoor setting we tested if higher levels of air ions, generated by special wall paint, affect subjective wellbeing, cognitive performance and cardiovascular parameters.

Healthy volunteers (n=20; 20-55 years) participated in a cross-over experiment in two identically adapted living rooms. Subjects were exposed to different levels of air ions for two hours each (one week interval). Wellbeing and cognitive performance were assessed by standardized questionnaires (self-condition scale by Nitsch) and tests (general performance test by Horn). Effects on cardiovascular regulation, heart rate and heart rate variability were investigated by measurements with a portable ECG recorder. Prior to analyses the continuous ECG recordings were visually inspected for artifacts. Spectral analysis was performed for the different experimental phases. Levels of air ions, volatile organic compounds and indoor climate factors (temperature, humidity) were determined by standardized measurement procedures.

Measurements of air quality and indoor climate in the two test rooms did not reveal any significant differences except in concentration of air ions (average concentration 1.038 vs. 2.194 ions per cm^3). With regard to self-condition, in both settings a significant decrease in readiness for exertion and tension as well as a significant increase in tiredness and sleepiness of the test persons was observed. Analysis of heart rate variability showed a significantly higher LF/HF-ratio in the test room with higher air ion levels. This was a consequence of a simultaneous increase of the low frequency (LF) and a decrease of the high frequency (HF) component. Furthermore, three (general knowledge, logical thinking, perception speed) of the nine subtests of cognitive performance were solved significantly better in the room with the higher ion concentration.

Air ions seem to have subtle effects on the autonomous nervous system (in terms of an increase of sympathetic accompanied by a small decrease of vagal efferent activity). Short term exposure was not associated with better wellbeing but increased cognitive performance.

Gender influences in indoor air quality perception for individuals in tropical climate

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There is increasing evidence that temperature and relative humidity are determinants for Indoor Air Quality (IAQ) perception, but their specific effects in different subsets of the population are yet to be determined. Gender differences in indoor air quality perception are still controversial and geographic and climate variations can alter substantially the perceived indoor air quality**.**

Compare men and women with regard to patterns of IAQ perception under constant relative humidity and different temperatures in an experimental office environment, by means of a visual analogue scale of IAQ.

To address this question thirty-three subjects grouped by gender were exposed to 14, 18, 22 and 26 degrees Celsius (°C) – or, correspondingly, 57.2, 64.4, 71.6 and 78.8 degrees Fahrenheit (°F) – with a relative humidity of the indoor air of 65 ±7%. The selected population wore standardized thermal protection clothing of 1.0 CLO unit. Temperature tests were performed in a heat- and humidity-controlled 34.8 m^2 chamber isolated from sound, light, and natural ventilation already described in other chamber studies in an experimental office environment. Results were obtained by a self-administered visual analogue scale questionnaire and analyzed using mean score comparisons and principal component analysis of indoor air perception.

The female group reported a colder sensation than the male group at 14°C (p=0.016). All other IAQ perceptions did not differ between genders**.** Principal component analysis: At 14°C (57.2°F), the Female group showed a correlation among good IAQ, feelings of freshness, well-being and easy mental concentration. In the Male group a strong correlation among good IAQ, well-being, freshness, easy mental concentration and draughty feeling.

At 18°C (64.4°F), The Female group showed a strong correlation among freshness, well-being, draughty and cold indoor air. In the Male group showed a correlation among the perceptions of easy mental concentration, freshness, well-being, non-stagnant air and good indoor air.

At 22°C (71.6°F), in the Female group showed a correlation among non-dry (humid) air, draught, easy mental concentration, freshness and well-being, whereas in Male group showed a strong correlation among easy mental concentration, freshness, well-being and good IAQ, which correlated inversely with dry air sensation.

At 26°C, the Female group showed a correlation among dryness, cold air, freshness, well-being and easy mental concentration, and the Male group correlation among perceptions of freshness, easy mental concentration and well-being.

Apart from colder temperatures far from thermoneutrality both groups showed no differences in IAQ scores and very close patterns of indoor air quality perception suggesting a role for other contributing factors as cultural and dressing habits as determinants to gender differences in indoor air-quality perception concerning individuals living in tropical climate.

Indoor Air Quality in Health Centers

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The architecture, the concept of housing, health and comfort have evolved over time, in order to promote modern and human life. However, despite today's housing are more comfortable, the compounds potentially pollutants inside have increased. These pollutants come of their own building materials, synthetic materials, cleaning products, automated systems, printers, ventilation and air conditioning systems. Thus, in order to assess Indoor Air Quality (IAQ) in buildings, there is the present study, which aims at assessing quantitatively the concentration of pollutants status indicators of IAQ, they are carbon monoxide (CO), carbon dioxide (CO_2), and PM_{10} particles, and the parameters of thermal comfort, temperature and relative humidity. The target sites of the evaluation were the Health Centers of Sátão, and respective extensions of Health, and Vila Nova de Paiva. In each Center and Health Extension IAQ parameters were monitored in treatment rooms, waiting rooms, doctor's offices and secretariats. We intend to also assess the perception of users about IAQ. The devices used were IAQ meter portable direct reading, TSI Model 8552/8554 brand, Q-Plus TM Traq collection of CO, CO_2, Temperature and Humidity and IAQ HH 3016 for particulate matter.

The software used for statistical analysis was SPSS version 15.0. The interpretation of statistical tests was based on the level of $\alpha = 0.05$ confidence interval (CI) of 95%. From the analysis carried out there were some significant exceedances for some of the health centers with regard to particles parameters, temperature and relative humidity. Of questionnaires administration it appeared that.

Indoor Air Quality in Portuguese Archives: a Snapshot on Exposure Levels

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In Portugal, indoor air quality is recognized as an important aspect of a properly working institution but, for most Cultural Heritage safe keepers, it is still very difficult to perform. Budget constraints, lack of knowledge in terms of the possible chemical interactions between the environment and the materials and lack of communication between science and practice are some of the reasons pointed out by the institutions for dismissing such a study.

Faced with a lack of published data for Portuguese archives/museums an indoor air quality survey was implemented in four Portuguese archives. Biological and contaminant analysis were complemented with detection of O_3, formaldehyde, CO, CO_2 and VOCs levels. Along with a RH and temperature study, a particulate matter distribution assessment was also performed.

The results obtained gave a first image of the conditions experienced in these locations. Figure 1 shows the presence of a potentially keratinophyllic fungi (*C. carmichaelli*) in an archival box and *Stachybotrys chartarum* in the ceiling of one of the deposit rooms. This is a potentially toxinogenic fungi which, according to the Portuguese legislation (NT-SCE-02) is indicative of a poor air quality.

Pollutants wise, Table 1 shows one of the studies performed and the values for some of the contaminants analysed are above legislated. It is the case for ozone (limit value 0.1 ppm) and VOC (limit value 0.1 ppm). Ozone levels may be due to concentrated outside levels while VOCs, in this setting, can be a product of the deterioration of ancient books, fumigation chemicals or fungal presence. Several workers assigned to Deposit room 1 later presented symptoms such as headaches due to the intense odour felt at this room which forced functions to be temporarily ceased.

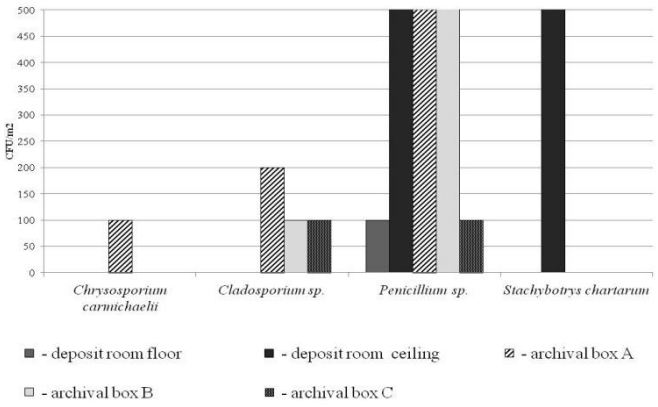

Figure 1 - Fungal genera/species present in one of the Archives studied.

Working closely with the institution made it possible to ascertain the impact of such studies, since they have been directly responsible for changes in procedures such as cleaning habits, use of gloves while handling ancient documents and acquisition of safety material for the workers.

Table 1 - Contaminant levels for one of the Archives studied. Values above legislated are in bold.

Location	O_3 (ppm)	VOCs (ppm)	Particulate matter (PM10) mg/m^3
Ref. point	0.59	0	0.035
Working room	**0.70**	0	0.096
Deposit room D2	**0.69**	**2**	0.034
Deposit room 1	**0.70**	**2.6**	0.027
Reading room	**0.68**	0	0.144

Though there are no established limits in terms of indoor air quality in these settings - where not only people but art and history matter - the assessment of the actual conditions is vital for a future attempt to keep them under control.

Sick building syndrome – Assessment of indoor air quality in a higher education institution departament's

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Air quality affects our well-being and can greatly determine our future. Therefore, indoor air has been mentioned as a major environmental risk to public health. Nevertheless, levels of indoor air pollution within buildings may be 2 to 5 times higher than outdoors.

In public buildings, especially in higher education institutions, the functions within these buildings achieve greater complexity, especially in areas designed for research, and thus indoor air quality is of prime importance, due to harmful effects it may have on the health of occupants as well as their activities and performance.

The purpose of this project is to evaluate indoor air quality in a higher education institution and to analyze the symptoms perceived by its occupants and evaluate if they are affected by sick building syndrome (SBS).

The specific aims are:

a) assess the indoor air quality of the building "E";

b) identify and describe the different symptoms perceived by the occupants and whether there is a relationship between complaints and indoor air quality;

c) identify the locations and / or equipments which may enhance the development of discomfort symptoms;

d) provide details of any corrective action to be implemented, following the results of the IAQ assessment and answers to questionnaires.

The quantification of environmental parameters was based, first on the structural and operational characterization of the building, and then on measurements of physical parameters (temperature, relative humidity, ventilation) and examining the concentrations of carbon monoxide, carbon dioxide and particles.

Concerning the analysis of symptoms perceived by the occupants an individual questionnaire will be applied.

The building is almost fifty years old, without any rebuilding structural works, it is located in an area of intense traffic. A first visit to the building was performed, in order to verify their function conditions. The ventilation is natural in all rooms, without any AVAC system and the building is well maintained without mould signs.

Many studies pointed out that ventilation is the main problem or the more important factor, as it represents almost 52% of the QAI problems and, also it is the more important risk factor to SBS.

Based on the results obtained in previous studies, it is assumed that the main problem is the high concentrations of CO_2, as the physical parameters are outside the comfort zone established by applicable legislation. For example, in at study done by Ferreira, T., *et al*., 2011, most spaces exhibited CO_2 concentrations above the limits and the maximum CO_2 concentration registered was of 1623 ppm. The main symptoms reported by occupiers of the spaces are “fatigue” and “headache”.

In conclusion a good ventilation can provide, a clean and good indoor air quality.

Indoor air quality and thermal comfort - Results of a pilot study in elderly care centers in Portugal

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Problems of indoor air quality (IAQ) are recognized as important risk factors affecting human health. In residences, day-care centers, retirement homes and other special environments, indoor air pollution affects population groups that are particularly vulnerable owing to their health status or age (WHO, 2010). The age of the European population is rising, and the percentage of adults aged 65 years and older is projected to increase from 16% in 2000 to 20% in 2020 (Adan *et al.*, 2006). Older persons spend about 19-20 hours per day indoors (WHO, 2003), and many spend essentially all of their time indoors in elderly care centers (ECCs). Moreover, older persons may be particularly at risk of adverse health effects from pollutants, even at low exposures, due to multiple underlying chronic diseases. Therefore, the study of IAQ among the elderly is becoming an important research issue.

This study is design to analyze 320 elderly living in Porto in ECCs. Both individual persons and ECCs were chosen randomly among 1550 elderly living in 56 ECCs. This population is being studied to collect the following data types: (i) health and quality of life questionnaires including St. George's Respiratory Questionnaire (Jones *et al.*, 1991; ATS, 2000) and the World Health Organization's Quality of Life – BREF (WHO, 2004; Liang *et al.*, 2008; Bobic *et al.*, 2009); (ii) building structural and environmental characterisation; (iii) IAQ parameters including formaldehyde, particulate matter up to 10 micrometers in size, total volatile organic compounds, carbon monoxide, carbon dioxide, total bacteria and fungi species identification, temperature, relative humidity; and (iv) perceived IAQ, including predicted mean vote (PMV) and predicted percent of dissatisfied people (PPD). IAQ monitoring is being performed during spring/summer and autumn/winter in ECC areas within dining rooms, drawing rooms, medical offices and bedrooms. Ambient air samples are also collected for comparison to the indoor measurements. This paper presents results of a pilot study for this ongoing work, and specifically describes findings at 6 ECCs studied in two seasons).

The study areas were all natural ventilated, had a mean floor area of 30 m^2, and the following mean occupancy rates per room during monitoring: dining rooms (3.8), drawing rooms (7.2), medical offices (1.5) and bedrooms (0.4). IAQ autumn/winter results indicate that indoor concentrations are within the Portuguese reference values, but 40% of the participants were dissatisfied with indoor thermal conditions, rating it ‘slightly cool’.

Results for the spring/summer season show a lower rate of dissatisfied persons (8%), but fungal concentrations exceeded reference levels (> 500 CFU/m^3).

To our knowledge, this is the first study in Portugal to assess effects of indoor air contaminants on health status and quality of life in older persons living in ECCs. Although the preliminary results suggest that indoor concentrations of most parameters were within reference values, the results highlight several issues, including the need to improve the balance between IAQ and thermal comfort in ECCs.

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Indoor fine particulate matter concentrations and natural ventilation in five primary schools

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Particulate matter is among the most pernicious pollutants in the ambient air and, consequently, also indoors, as the indoor air is basically the outdoor air indoors. The noticeable relevance of the exposure to particulate matter indoors results from the fact that people spend up to ten times more time indoors than outside. There are basically two strategies to control indoor air pollution: source control and ventilation. Being outdoor air one of major sources of the pollution indoors and natural ventilation based on untreated outdoor air brought indoors, there is here a problem that seems not to have a straightforward solution. Ventilation with outdoor air may play a double contradictory role influencing indoor human exposures: while it decreases the concentration of indoor emitted pollutants, it can contribute also to increase the presence indoors of the outdoor pollutants, namely, fine and ultrafine particles (Jantunen *et al*., 2011). The aim of this paper is to assess the particulate matter concentrations in 5 primary schools in Porto and to study the influence of the ventilation rates on the fine particles levels indoors.

Data were collected as part of a more comprehensive investigation, in the context of the on-going EscolAr project - “On the contribution of schools indoor environments to children´s overall indoor exposure”. Monitoring data on indoor and outdoor particulate matter and carbon dioxide (CO_2) levels, as well as on classroom occupancy, activities and ventilation strategies were collected in a total of 5 primary schools in Porto, Portugal, during winter season. All the classrooms were ventilated by natural means via open doors and windows. PM_1, $PM_{2.5}$ and PM_{10} concentrations were monitored continuously over periods of 24 h. Continuous measurements of CO_2 were performed over 5 consecutive days. The particle concentrations were calculated only from the data collected during occupied periods. Air changes per hour (ach) were calculated using the CO_2 generated by the occupants as a tracer. The ventilation rate per person was calculated based on the “ach” value, the space volume and the number of occupants.

The guideline value of 1000 ppm for CO_2 concentration was exceeded in all schools reflecting the low ventilation rates (range: 6.0 L/s to 8.4 L/s), as doors and windows were kept closed for most of the scholar period. The results pointed out that indoor levels of PM_1 and $PM_{2.5}$ were more likely to be affected by outdoor penetration (I/O<1) rather than by indoor sources.

The presence of pupils and the intensity of their indoor activities mainly resulted to the ressuspension of indoor coarse particles and mostly contributed to the increase of PM_{10} levels in classrooms. This is consistent with the observations from other studies (e.g. Fromme *et al*. 2008; Kingham *et al*. 2008; Branis *et al*. 2009). In general, classrooms with a higher "ach" had a higher indoor proportion of outdoor fine particles.

A Wintertime Indoor and Outdoor Air Quality Assessment at Schools in Aveiro, Portugal

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Several studies performed in different environments over the last years have indicated that indoor air quality (IAQ) is poorer than the one found outdoors. Since, on average, 90% of human time, in developed countries, is spent indoors, it is very important to study the existing concentrations of common pollutants in indoor environments. Elementary schools are a microenvironment with a special interest to the scientific community because its main occupants are children, who are considered to be a susceptible group and, therefore, are more vulnerable to the effects that poor IAQ may have on their health.

On January 2012, a study was carried out in three different elementary schools (city centre, suburban and rural) in Aveiro, Portugal, to determine the average concentrations of pollutants, such as nitrogen dioxides (NO_2), ozone (O_3), volatile organic compounds (VOCs) and formaldehyde. Comfort parameters like carbon dioxide (CO_2), carbon monoxide (CO), temperature (T) and relative humidity (RH) were also registered. To assess the relationship between indoor and outdoor values, all the parameters were simultaneously monitored in three classrooms and at the playground of each school during a one-week period.

The results obtained for NO_2 and O_3 were cohesive in every school showing that the values found in the outdoor air were higher than those indoors. The NO_2 values ranged from 15.0 to 17.8 $\mu g.m^{-3}$ in the indoor environments and from 28.2 to 39.3 $\mu g.m^{-3}$ in the outdoor air. The O_3 was only quantifiable in outdoor samples with values fluctuating from 17.3 to 18.6 $\mu g.m^{-3}$.

Benzene, a compound usually associated with vehicle exhaust emissions, was detected at indoor/outdoor ratios in the 0.56-0.89 range. Its concentrations were always lower than 4.3 $\mu g.m^{-3}$. Pinene and limonene were only present in indoor samples, reaching levels up to 3.3 and 162 $\mu g.m^{-3}$, respectively. These terpenic compounds, specially the fragrance d-limonene, are well-known as emitted substances from cleaning products. □-Pinene can be considered in the same manner and additionally as an intrinsic component in wood and furniture.

Pointing out the importance of indoor sources, formaldehyde presented substantially higher concentrations in the classrooms (6.7-12.6 $\mu g.m^{-3}$) than outdoors (3.9-4.6 $\mu g.m^{-3}$). Indoor/outdoor ratios between 3 and 12 and mean CO_2 concentrations during the occupancy periods up to 4957 $\mu g.m^{-3}$ denote the highly inadequate ventilations. On average, the CO levels were 0.43±0.19 ppm and no clear relationship was observed between indoor and outdoor levels. In some classrooms, the acceptable relative humidity values (30-60%) were exceeded. In most indoor spaces, the average temperatures were lower than the comfortable range in wintertime (20-23ºC) stipulated by the ANSI/ASHRAE Standard.

Contribution of Houseplants to the Reduction of Vocs in Indoor School Environment

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The occurrence of serious problems associated with poor indoor air quality in schools in Portugal and other countries is well documented. Indoor air pollutants can cause discomfort and reduce school attendance and productivity. In particular, volatile organic compounds (VOCs) contribute to short- and long-term health problems. VOCs are originated from numerous sources and present in the indoor environment at substantially higher concentrations than in outdoor air. Hence, measures are required to reduce the indoor VOC levels in school environment.

In this work, the ability of houseplants to reduce VOCs in school indoor air has been studied. The sampling has been carried out without and with houseplants in an elementary school classroom (Aveiro, Portugal). Simultaneously, outdoor air sampling was performed at the school playground. VOCs were collected during occupied periods by active sampling in adsorbent tubes and analysed by a thermal desorption/cryogenic concentration method on a gas chromatograph with flame ionisation detector (GC-FID).

The concentrations of total VOCs detected in classroom without plants varied between 120 and 515 $\mu g.m^{-3}$, whereas a drastically decrease to 27.3-79.8 $\mu g.m^{-3}$ was observed in the presence of potted-plants. At the same time, the outdoor concentrations at the corresponding time periods ranged between 7.32-83.9 and 9.97-53.7 $\mu g.m^{-3}$, respectively. Thus, houseplants contributed substantially to the diminishing of indoor VOC levels. Aromatic compounds were the most abundant species accounting for 46% and 26% of the total VOC levels in the indoor air without and with plants, respectively. Xylenes and toluene, the dominant aromatic VOCs, showed the highest concentration decrease in the presence of plants. The *m,p*-xylene concentrations decreased from 4.5-141 to levels ranging from the limit of detection to 4.74 $\mu g.m^{-3}$. In the case of benzene, the decline of indoor concentrations was from 1.03-6.15 to 0.57-1.86 $\mu g.m^{-3}$. Among other classes of VOCs, aliphatic hydrocarbons (*n*-hexane and 2-methyl-pentane), terpenes (3-carene, limonene and *α*-pinene) and oxygenated compounds (methylacetate, hexanal, 2-butanone, and benzaldehyde) were rather abundant and suffered the most drastic reduction in the presence of houseplants. It may be concluded that indoor plants represent a prominent tool to ensure more safety environmental by removing hazardous VOCs. In particular, the placement of houseplants as phytoremediation units in classrooms may be considered as a suitable practice to diminish the indoor VOC levels thus fulfilling the air quality requirements.

Risks associated with exposure to PAHs in indoor air influenced by tobacco smoke

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Human health risks related to indoor exposure to hazardous pollutants is a current concern. Polycyclic aromatic hydrocarbons (PAHs) are organic pollutants that have negative impacts on human health as some of them are considered carcinogenic (possible, potential) to human beings. PAHs are produced by various combustion processes; however indoors tobacco smoke is considered as one of their most significant sources. Considering the health relevance of these compounds, the objective of this work was to assess the risks associated with exposure to tobacco smoke in Portuguese homes.

Eighteen PAHs (16 PAHs considered by U.S. EPA as priority pollutants, dibenzo[a,l]pyrene and benzo[j]fluoranthene) were collected in air of two smoking and nonsmoking homes, situated in city of Oporto, Portugal. The samples were collected daily by constant low-flow samplers (Bravo H2, TCR TECORA, Italy) that were combined with sampling heads for gaseous and particulate samples (in compliance with norm EN12341 for PM_{10} and EN14907 for $PM_{2.5}$); an air flow rate of 2.3 m^3/h was used. The extraction and quantification of PAHs was performed by microwave assisted extraction and liquid chromatography. Carcinogenic risks associated with exposure to PAHs were assessed according to the methodology provided by US EPA Region III Risk–based Concentration Table for nine different age categories, namely: children 1–3 years, children 4–6 years, children 7–10 years, adolescents 11–14 years, adolescents 15–19 years, adults 20–24 years, adults 25–54 years, adults 55–64 years, and seniors >65 years.

At the smoking home (with 3-5 cigarettes smoked per day) the mean concentration of 18 PAHs ranged from 28.3 to 106 ng/m^3 (mean of 66.7 ng/m^3). Carcinogenic risks exceeded the health–based guideline level set by USEPA (10^{-6}) for 5 different age categories. The highest risks values were observed for adults with 55–64 years (4.87×10^{-6}) and seniors (5.85×10^{-6}). These results indicate that long–term exposure to PAHs at levels found at smoking home increases carcinogenic risks. At the non-smoking home the levels of PAHs were significantly lower than at the smoking home, ranging from 17.9 and 62.1 ng/m^3 with a mean of 34.5 ng/m^3. The estimated carcinogenic risks were twice lower than at smoking home, however USEPA health–based guideline was at non-smoking home exceeded for three age categories, namely for adults with 25–54 and 55–64 years, and for seniors.

The high values of cancer risks in the absence of smoking indicate a significant contribution of PAHs from another source, possibly from outdoors; previous studies showed that in Oporto city traffic emissions are significant contributor of indoor PAHs.

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Indoor Air Quality in 24 nurseries in Brussels

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The "Green Ambulance" from the Region of Brussels receives mainly demands for the children less than 6 years old. They represent the third of the enquiries. Usually, the CRIPI team comes into the patient's dwellings. But it is not the only source of indoor pollutants exposure. Nurseries are places in which children spend a lot of time.

A project on the indoor air quality in nurseries in Brussels helped to carry out enquiries in 19 nurseries. Analyzed on a voluntary basis, these nurseries are differentiated by their time of construction, traffic and park proximity, the surrounding environment and the size.

Biological and chemical samplings are performed. These data are completed with noise measurements in playrooms, dormitories, bathrooms and kitchens. A questionnaire on the nursery organisation (staff, the number of children by section, …) and also general data of the building, cleaning products and disinfectants used, renovations, … has been filled with the help of the director or the nurse of the nursery.

The parameters analyzed are the volatile organic compounds (VOC), the formaldehyde, the pesticides, the carbon monoxide, the carbon dioxide and the nitrogen oxides in the ambient air, the lead in paints, temperature and relative humidity in each room.

The carbon dioxide concentration shows that a lot of nurseries have an inadequate ventilation. Some of these nurseries contain lead paints, high terpenes levels, humidity problems and outbreaks of mould development. At this time, a new study is underway to determine the effectiveness of cleaning in the nurseries.

Ten years of "Green Ambulance" in Brussels

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Before the year 2000, indoor air quality and its impact on the health were not a major subject of interest. In the Region of Brussels, the initial situation was there wasn't any housing code, any cooperation between housing sector and health sector. From this point, an original initiative, called CRIPI, is born. It considers the indoor environment and its impact on the health. A partnership has been made between the Brussels Administration Environment (IBGE-BIM) as coordinator and responsible of the chemical analyzes, the Institute for Public Health for the microbiological aspects and a NGO working on respiratory health problems (FARES) who is charged with the patient's relations.

The beginning of an investigation is a demand from a medical doctor which includes the specific patient health problems, previous analyzes,… A systematic sampling for both chemical and microbiological pollutants is performed. A questionnaire is filled with the patient and first advises on general healthy housing are given. After the analysis of the samples, a social nurse comes back in the patient's dwelling to give the specific advises related to the results and the report is also sent to the medical doctor to complete the medical diagnosis. One year later, an evaluation on health improvements is done.

Until now, more than 1600 dwellings have been visited by the CRIPI team. One year represents approximately 160 enquiries. More than 600 medical doctors had already asked for at least an enquiry. With all these data collected, it is possible to have an global overview on the indoor air quality in Brussels. The main observed problems are damp, mould, high levels in some VOCs (benzene, terpenes, formaldehyde, …).

Indoor air quality: schoolchildren exposure and Portuguese legislation

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Indoor air quality (IAQ) is an increasingly strong concern related to the public health since the cases of problems directly caused by human exposure to polluted air continue to increase in Europe. Each indoor microenvironment has unique characteristics, determined by the local outdoor air, specific building characteristics and indoor activities. Children are amongst the members of the population most susceptible to air pollutants because they breathe higher volumes of air relative to their body weights and their tissues and organs are growing. IAQ problems in schools may be more serious than in other categories of buildings, due to higher occupant density and insufficient outside air supply, aggravated by frequent poor construction and/or maintenance of school buildings. Therefore, IAQ has been related to the increase incidence of allergic, asthma and infectious diseases. Poor IAQ can also affect scholarly performance and attendance of children.

The present study aims to evaluate the IAQ in an Oporto school that is located close to a highway exit point; throughout the day, the respective area is strongly influenced by traffic emissions. Sampling was performed during five weeks in winter 2012. IAQ parameters, namely temperature, relative humidity, formaldehyde, carbon monoxide (CO), carbon dioxide (CO_2), ozone (O_3) and volatile organic compounds (VOCs) were measured at a common playroom of the school during all week-days. All IAQ parameters were measured in the beginning and at the end of each school day, and typically with 25 to 90 children (from 3 to 6 years old) present in the room.

The levels of formaldehyde, O_3, and CO were always lower than the IAQ legislation limits (0.1 mg/m^3, 0.2 mg/m^3 and 12.5 mg/m^3, respectively). A strong association between the CO_2 levels and children occupancy was observed, with experimental values slightly higher than the recommended (1800 mg/m^3). Regarding VOCs, the determined values exceed largely the maximum reference values established in the Portuguese legislation (0.6 mg/m^3 considering isobutylene as standard reference) with values ranging from 0.26 to 1.93 mg/L.

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Children's exposure to indoor air: the case of the Childminders homes

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The majority of children's time is spent indoors i.e. at home or at school. In the last decades an increased number of parents choose their children to be taken care of by childminders in their homes, providing this way a more friendly, "home-like" and quite flexible environment for them. Scientific evidence has shown that exposure to indoor air pollution in schools and kindergartens can contribute to short and long-term health problems including asthma, allergic reactions and respiratory tract infections. Based on this evidence, the aim of this study was to investigate the children's exposure to indoor air, taking also into account the emerging need to assess the risk in this particular context: the childminders home environment.

The current study was conducted in eight licensed childminders listed in Ermesinde, Porto. The levels of CO_2 and CO, were measured as well as $PM_{10,}$ air temperature and relative humidity. Indoor samplers were placed in representative locations according to technical note NT-SCE-02, 2009. Environmental parameters were collected in real time, using direct reading equipment. In order to analyse the perception of childminders about children symptoms a questionnaire was given following the instructions of the environmental questionnaire developed by the International Study of Asthma and Allergies in Childhood. The values of the monitored parameters were compared with Decree-Law No. 79/2006 of April 4th and Decree-Law No. 80/2006 of April 4th.

In each home, eight activity rooms and eight rest rooms were assessed. The results showed that the average CO_2 concentrations ranged between 851 mg/m^3 and 2597 mg/m^3 in activity rooms and between 1175 mg/m^3 and 3197 mg/m^3 in rest rooms. It was verified that 31 % of the evaluated spaces exceeded the reference value (1800 mg/m^3). In general, rest rooms had higher average CO_2 concentration which can be associated with insufficient ventilation rate. The average CO concentrations ranged between 3.0 mg/m^3 and 5.7 mg/m^3 in activity rooms where as in rest rooms the levels ranged between 3.0 mg/m^3 and 4.8 mg/m^3. These results were below the reference value (12.5 mg/m^3), suggesting the absence of internal sources of this agent. The PM_{10} concentrations obtained were also below the reference value (0.15 mg/m^3).

Results concerning air temperature revealed values between 16.7 °C and 25.2 °C in activity rooms and 19.0 °C to 25.7 °C in rest rooms. In this case, 63% of the evaluated spaces exceeded the reference value (20ºC). In terms of relative humidity, values varied between 51.4% and 70.9% in activity rooms and between 55.8% and 79.4% in rest rooms. All spaces exceeded the reference value (50%). Regarding the perceived symptoms, most of the childminders reported that the majority of children showed no symptoms related to respiratory diseases.

In conclusion, this preliminary survey provided useful data for both risk assessment and risk management related to children's exposure to indoor air pollution. Further studies with a larger number of participants and measurement of other important IAQ indicators as a presence of microorganisms and VOC concentration should be designed in the future.

Winter Ventilation Rates at Primary Schools: Comparison between Portugal and Finland

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Poor ventilation in schools has been demonstrated to have a negative impact in children's learning performance, absenteeism and health effects, such as increased risk for asthma and other health-related symptoms. Other consequence of poor ventilation is the accumulation of human metabolites, microorganisms and pollutants emitted from furniture, building materials and other indoor sources. Children are more vulnerable to environmental pollutants compared to adults since they breathe more air relative to their body weight, and also have a lower capacity to deal with toxic chemicals.

In teaching facilities, the current ventilation standards and guidelines by ASHRAE recommend a minimum ventilation rate of 7 l/s per person (ANSI/ASHRAE Standard 62.1-2007). The European Standard prEN15251and REHVA Guidebook 13 propose performance-based standards limiting the level of carbon dioxide (CO_2) concentration to 1500 ppm over a full school day from 9:00 to 15:30 and specify a minimum ventilation rate of 3 l/s per person in all teaching and learning spaces when they are occupied.

This study focused on the comparison between two different types of schools ventilation: natural (NV) and mechanical (MV). Generally, the type of ventilation is an indicator of the country climate characteristics. South European countries, such as Portugal, have mainly NV schools while North European countries, as Finland, have MV schools. CO_2 surveys in primary schools of both citied countries were performed during the winter period. In each school, CO_2 concentrations were continuously monitored in classrooms during a school day using automated data loggers (Portugal: Wolfsense IQ-610; Finland: HD21AB17 Delta OHM, Q-track 7565 and ClimaBox 3). The CO_2 build-up method was used for estimating ventilation rates during classes.

Table 1. Range Values of the comfort parameters in the studied schools.

School	Temperature (ºC)	Relative Humidity (%)	CO_2 (ppm)
Finland	16.4 – 23.3	13.5 – 39.8	368 - 1383
Portugal	15.1 – 21.5	46.7 – 75.9	469 -1314

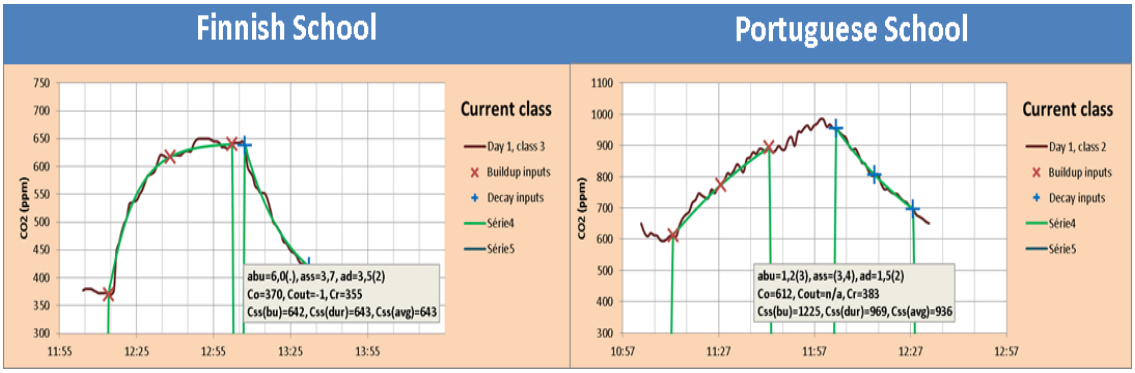

Figure 1. Example of the CO2 curves and the build-up method application for schools in Finland (left) and Portugal (right).

Table 2. Resume of the assessed ventilation rates for the studied schools.

School Country	Nr of CO_2 events	AER (h^{-1})	Q_1 (lps)
Portugal	8	1.1 ± 0.2	2.6 ± 0.4
Finland	30	5.1 ± 1.5	14.7 ± 4.9

Table 1 shows that the classrooms indoor air in Finland is drier and no significant difference between CO_2 levels were found between the two countries. However, major differences in air exchange rates (AER) between both countries were found (Table 2). Monitored Finnish classrooms had an average AER of 5.1 h^{-1}, while in the Portuguese classrooms the mean value was 1.1 h^{-1}. Finnish schools registered mean ventilation rates (Q_1) of 14.7 lps which are above the recommended values. In contrast, Portuguese classrooms showed very low ventilation rates, namely mean values of 2.6 lps. This study indicates that during winter time, naturally ventilated schools may show ventilations rates clearly below the recommended values. Such cases require intervention to improve a potentially serious indoor air quality problem.

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Testing CO_2-based estimation of ventilation rates in schools with natural and mechanical ventilation

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Ventilation is a key factor determining the indoor concentrations caused by indoor sources and infiltration of outdoor pollution indoors. Non-intrusive and automatic CO2 monitoring has been proposed for estimation of ventilation in occupied indoor spaces. Most commonly applied methods include the steady state method (e.g. ASHRAE D6245-2007) and decay method after the space has become unoccupied (e.g. Palonen *et al*., 2009). Both methods require estimation of the fresh air CO2 level using e.g. another monitor outdoors and the steady state method further applies an estimated CO2 generation level of the occupants. Hänninen (2012) proposed a method to solve the replacement air CO2 concentration and the CO2 generation level from the decay and build-up curves, respectively. The current paper aims at testing the proposed method in schools with natural and mechanical ventilation and compare with the previously used methods.

As part of the WHO school indoor air quality, sanitation, hygiene and smoking control survey a semi automatic Excel-tool was developed for estimation of replacement air CO2 level and CO2 generation level from the decay and buildup events during a school day. The tool also calculates air exchange rates during these events and the steady state, if reached during the classes. In the current work the tool was used to estimate these parameters from SINPHONIE school data collected in naturally ventilated schools in Cyprus and mechanically ventilated schools in Finland during autumn 2011. The estimates from the proposed outdoor measurement independent approach are compared with the earlier methods.

One of the main benefits of the second degree curve solution for the steady state concentrations is the fact that the air exchange rate estimates become independent of device calibration errors. The CO_2 data in Cyprus and Finland monitored in the SINPHONIE project demonstrated that in some cases the outdoor monitor levels were higher than indoor levels, likely cause being device sensitivity to the temperature and/or humidity outdoors.

In very low ventilation the steady state is not reached during a standard 45 min class; using the steady state method for estimating ventilation rate in such cases is likely to lead to overestimation of the ventilation rate.

The decay method is traditionally recommended for the last class of each day, producing reliable estimates for that situation. However, the ventilation rates during the school day may differ from that of the evening and night and therefore estimation of the ventilation rates from the build-up events is likely to provide best representation of the ventilation prevailing during the school day.

Ventilation rates at the schools with mechanical ventilation systems were higher than in the naturally ventilated schools. In the naturally ventilated schools investigated in this paper the lower class time ventilation was compensated by opening windows for the breaks, yielding short and efficient air exchange in the classrooms.

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Occupational Exposure to Wood Dust in Small Wood Business in Sarchí, Costa Rica

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Wood dust has been estimated as the sixth most important occupational carcinogenic agent in Costa Rica. Sarchi, a small village known as the "wood art craft capital of Costa Rica" has a strongly dependent economy from furniture and art craft small business. According the Health Ministry, Sarchi has around 250 small wood shops, most of them working under informal conditions and without control of occupational risks. IARC declared since 1995 wood dust as a carcinogenic to humans (Group 1). Conditions in which exposure to wood dust happens in tropical countries have not been documented. Differences in technology, wood species, previous treatment processes, relative humidity and temperatures, among other, could have effects on exposure patterns to wood dust, regarding the studies carried out in non tropical countries.

The present study was aimed to evaluate exposure levels of wood dust in small Costa Rican art craft and furniture shops. Personal sampling was performed in six shops selected by suggestion of the two small business organization boards. After a walkthrough, jobs with critical exposures were selected for the sampling process. A total of 32 full shift personal samples were collected. Lognormal transformation of the data was considered. A geometric mean of 6,9 mg/m^3 (geometric standard deviation: 3,4) and a mean of 12,6 mg/m^3 (standard deviation: 15,4) describes the collected data. Maximum Likelihood Estimator was computed with a value of 14,9 mg/m^3 (95% Lower Confidence Limit: 9,8; 95%Upper Confidence Limit: 26,8 mg/m^3).

Considering the permissible exposure levels (1 mg/m^{3}for softwoods and 5 mg/m^3 for hard woods), adopted by the country as technical norm, there is health risk for these workers. Results of occupational exposure in the present study were higher than those reported in the literature for similar jobs in developing countries, explained partially by the differences in working conditions and technology.

Low Cost Control to Wood Dust in Small Wood Business in Sarchí, Costa Rica

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Sarchí, is known as *"the Costa Rican cradle of wood handicraft and furniture".* Occupational and environmental exposures to wood dust were considered the most important threats to public health. Results of occupational exposures mentioned in the literature and ratified by an exploratory study and lack of support from government create a situation where design and implementation of low cost controls is required to prevent adverse health effects.

Promote better quality of life by improvements of working conditions among small wood shops through the participative design and implementation of low cost engineering and administrative controls of wood dust.

Selection of companies was based on the will to participate in the project. Training was divided in: a) health risks associated with occupational wood dust exposure, and b) administrative and engineering controls. By individualized visits at least one case was selected by owner. Description of situation to modify was done including sampling of emission points. Sampling was performed with air pumps (MSA), 37 mm cassettes and PVC filters of 0,8 µm. For 14 interventions in 10 shops 329 samples were collected. Reduction percentages and cost benefit were computed.

Project permitted to show it is possible to decrease wood dust emissions from machinery and equipments through low cost interventions. Reductions from 37,0-99,98 % at emission points were obtained. Interventions demonstrated to be efficient and accessible to low budget companies. Twelve interventions were lower than US$ 194. Use of scrap material, wood, discard material, parts of broken equipment and practical knowledge of their business let the owners to reach the goal. Commitment of the owners and their experience in wood working was a valuable resource, and these experience mixed with the training phase was useful to help them in the application of some basic concepts regard ventilation.

Regulations for hazardous chemical substances in Poland in 2011

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In 2011 The Group of Experts for Chemical Agents (GECA), worked in Nofer Institute of Occupational Medicine in Poland proposed health based Maximum Admissible Concentrations values (MAC) for 13 new dangerous chemical agents in the working environment: aniline [62-53-3], acetic anhydride [108-24-7], 3,4-dichloroaniline [95-76-1], octabromodiphenyl ether (technical mixture) [32536-52-0], dibutyl phthalate [84-74-2], hexachlorocyclopentadiene [77-47-4]; silica crystalline – quartz [14808-60-7] and cristobalite [14464-46-1] – respirable fraction, acetic acid [64-19-7], *N*-methylaniline [100-61-8], sodium peroxoborate [11138-47-9], hydrogen peroxide [7722-84-1], styrene [100-42-5], phosphoryl trichloride [10025-87-3]. Health based values, are derived from the most recent scientific data available and taking into account the availability of measurement techniques.

The MAC values in Poland have been set as follows: GECA within the Interdepartmental Commission for Maximum Admissible Concentrations and Intensities for Agents Harmful to Health in the Working Environment performs a critical evaluation of the documentation for the MACs prepared by individual members of the team. The experts prepare health-based documentation for recommended exposure limits along with analytical procedures, recommendations on pre-employment and periodical medical examinations and contraindications to exposure. The experts review all available data and information: experimental animal and human data, structure activity relationship, occupational (human) experience and select most relevant study and dose descriptor. In practice, the scientific data base to set an OEL is not ideal. GECA deals with this by using uncertainty factors. Those proposals are presented during a session of the Commission including representatives of the ministries of health and labor, and representatives of industry and of scientific institutions.

Polish OELs are legally binding administrative norms. To 2011 there are 509 health based MAC values for chemical substances in Poland regulation (Pol. J. of Law No 217/2002, pos. 1833 with amendments).

The specified MAC values constitute the guidelines for the designers of new and updated technologies and products, and the criteria for the evaluation of working conditions.

Exposure assessment on toluenediisocyanate using integrated theoretical and experimental data

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The purpose of this study was to determine if EASE and TRA-ECTOC, the knowledge-based artificial intelligence models, could accurately choose specific TDI concentrations that agreed with operator exposure samples, taken at polyurethane foam manufacturing plant.
Personal samples results, available for TDI in workplace atmosphere in Poland during polyurethane foam manufacture were compared to concentrations calculated from EASE and TRA estimates. The following process categories have been postulated:

- Use of blowing agents in manufacture of foam.
- Use in closed, continuous process with occasional controlled exposure.
- Including into matrix.

Average measured concentration of TDI was 18 µg/m^3 and median was 7,79 µg/m^3.
Box and whisker plots were constructed to compare the distributions of EASE and ECETOC-TRA-based estimates and the measured results for TDI. Both EASE and ECETOC-TRA – based estimates were consistently conservative because overestimated exposure. The selected TRA categories do not precisely describe the studied applications.

This study evaluated the usefulness of EASE and ECETOC TRA models as the screening tools for inhalation exposure assessment. Models have numerous advantages, theirs structure is clear, require few data, are available free of charge. Models are useful for preliminary exposure assessment or for quick estimation of workplace conditions or as an additional component of inhalation exposure estimation. When measurement data are available, they should be preferred to values estimated from models.

Vaccination of banking as a tool for health and efficiency

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The health worker is important in itself but is also a tool in business productivity, reducing absenteeism caused by diseases.

Immunization programs costing significant sums, but are not so expensive compared with the cost of handling each infectious disease preventable by vaccine. Vaccination improves quality of life and reduces absenteeism of employees. The benefits of immunization programs are thus evident.

Vaccination of employees is a rare theme in literature, and vaccination of banking even more rare, despite the economic importance of the sector in which there is close contact with the public, besides a closed environment and refrigerated, which represents a greater risk of acquiring viral diseases.

This study aims to further the discussion of the topic, check the vaccination status of employees and observe the relationship between vaccines and occupational suggested that applied in the banking of Natal (Brazil).

The results suggest that banks do not yet have the notion of the importance of vaccination in their employees and that sickness absence can be decreased in case of their application.

Work-related accidents in hospital environment: associated factors

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The hospital environment is characterized by large numbers of risks from chemical, biological, physical, psychosocial, that if strengthen to affecting the health of workers, both those of direct patient care as the support services to provide care, exposing them to favourable conditions for the occurrence of accidents at work.

To analyse the factors associated with accidents at work in a hospital unit of Lisbon and Tagus Valley between 2001 and 2010.

Retrospective cross-sectional longitudinal Study, for the period from January 1, 2001 to December 31, 2010. The information was obtained through registration of surveys of labour accident notification concerning anonymous 668 employees. Data collection was performed, by one of the researchers, after authorisation of the Board of Directors during the month of August 2011, on working days between the 09:00 and the 17:00 hours in the service of human resources.

Over the 10 years they have been notified 668 accidents at work, with an increase in notifications of 2001 (1.3) for 2010 (13). The higher prevalence of accidents fell in nurses 45.4, in feminine gender 88.3, in age group of 18 to 29 years 40 and 54.5 with degree. On average the accidents occurred at 13.2 hours, 50 relapsed in the first three hours of work and 69.2 in the first two days. Where there was greater notification of accidents was in inpatient services 41.8, followed by the emergency service 18, theatre 9.1 and accidents in itinere 7.5. The factors more prevalent were needle prick 41.2, the fall of the worker 17.2 and excessive efforts/inappropriate movements 13.2. The tools/instruments/appliances accounted for 55.8 of accidents, the mobilization of patients by 11.1 and pavement damaged or wet by 10.5. Resulted in absolute incapacity for work 24.9. In this type of accidents, the main factors were the fall of worker 34.9, excessive efforts or inadequate movements 31.9, mobilizing patients 24.7 and blows/cut caused by object 17.5. In itinere accidents accounted for 22.9. The professional group of MAA was the most reached 63.3 and possess qualifications that are smaller than the 9 year 42.8. The sprain/distention injury was responsible for 35.5 of these accidents followed by bruises/crimps 32.5. The Pearson correlation showed a significant positive association (p 0.000) between the number of accidents with incapacity the length of service and age group, and a significant negative correlation with the educational level, the time of the accident, the day of the week, the number of hours completed by the time of the accident and the day of the accident relatively to the last day of rest.

The factors associated with accidents differ depending on its severity and relate to age, length of service, time and type of activity performed. The data obtained provide subsidies to implement

preventive measures in order to act on the causes and consequently minimise this labour problem.

Evaluation of activities undertaken by Polish enterprises related to organization and work conditions as well as health protection of elderly workers

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In most European countries, systematic increase in the share of people over 50 years of age in the general population is observed. This is due to the progressive achievement of this age the baby boomer generation, born after World War II (the "baby boom") and the observed decline in fertility in recent decades. In the context of the labor market, this means reducing the number of people of working age. This process can take up to several decades. According to Eurostat (2011), the employment rate of people aged 55-64 was 34.0% (45.3% male, 24.2% women) in Poland in 2010, while in the European Union, it was 46.3% (54.6% male, 38.6% women).

Different activities are taken, to minimize effects of the progressive ageing of societies. One of them is age management, defined as an element of human resource management or management component to the variety (e.g. anti-discrimination on grounds of age, gender, race, religion

The goal of the study was to assess the actions taken in Polish enterprises in order to maintain the employment of older workers (50+), and to develop guidance on the rules and so-called age management good practice in order to maintain the employment of 50+ workers. For the purposes of the study two questionnaires were used: 1) questionnaire for employers and 2) questionnaire for workers.

Questionnaire for employers consists of several parts concerning, inter alia basic information about the company (number of employed people aged 50 +, number of employees who left last year to retire, the positions on which the 50+ employees are employed) and such issues as: recruitment, professional development, organization and working conditions, health care of 50+ workers.

In the first stage, 200 companies (small (9-49 employees), medium (50-249) and large (> 249)) were selected. Total employment in the selected enterprises was 34 972 persons of which 23% were older employees (37,2% women and 62.8% men).

Preliminary results indicate that only less than 10% of the enterprises run employment programs for those over 50 years of age. Of these companies, most admit that: adapt the recruitment of persons 50+ (84%), hold trainings addressed to persons 50+ (68%) and works with employment agencies (63%).Less than 7 of the enterprises provide training for healthy lifestyle and the aging process.

In 2012 we planned to carry out research among older workers (50+). They will concern, among others, their health, well-being, work ability and needs.

Self-Perceived Quality of Life of People with Physical Disabilities and Labour Force Participation

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A sense of quality of life of life depends on the structure of human needs, education, experience and general human culture, but note that it is dynamic, changes during the life of man. It depends very much on the surrounding world and the conditions under which man lives.(A.Sekowski 2006).

The goal of the study was to assess the self-perceived quality of life of people with physical disabilities from the perspective of work. The following tools were used for the purposes of the study: a personal questionnaire, an SF-36 questionnaire, a Polish adaptation of the Ferrans and Powers Quality of Life Index by Jaracz, and I-E Scales at work by Gliszczyńska. The study covered 426 people with physical disabilities aged 18 to 65.

Groups participating in the labour market (working on the open labour market and in protected work environments) rated their quality of life higher than the others, in respect of the Quality of Life Index.

For people looking for work, compared against those professionally inactive, the satisfaction of the health and functioning, social and economic and family life areas was significant. Those people found such areas as the psychological/spiritual area and family area important. For the respondents from the group looking for work, the important areas were: health and functioning, social and economic, and psychological/spiritual. The satisfaction with the psychological/spiritual area was also significant for that group.

On the basis of the scores of the SF-36 questionnaire, the conclusion is that the group working on the open labour market had the best perception of their quality of life. Only in respect of physical functioning, the score in this group was slightly lower than that of the group working in protected work environment. The self-perceived quality of life was the lowest for unemployed people not looking for work.

As regards the division of respondents into groups by the duration of looking for work, the differences between the groups were only significant in a single subscale of the Quality of Life Index: satisfaction with the psychological/spiritual area, and one SF-36 scale: general health. Both scales were rated best by the group of people who had looked for work for less than a year.

The quality of life was best perceived by those professionally inactive for up to two years. The worst perception of quality of life, in turn, was demonstrated by people professionally inactive for more than five years.

Groups participating in the labour market rated their quality of life higher than the others, in respect of the Quality of Life Index.

On the basis of the scores of the SF-36 questionnaire, the conclusion is that the group working on the open labour market had the best perception of their quality of life.

The sense of internal control with its two constituents, i.e. the life philosophy and sense of control at the work place had a positive influence (albeit weak) on each of the quality of life dimensions measured by the SF-36 questionnaire.

The influence of occupational factors on the prevalence of musculoskeletal disorders in the users of notebook computer

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Notebook computers have recently been used as an increasingly common main work tool but without being adapted to the workstation. One of the most common complaints reported by the workers who use a computer in their professional work are musculoskeletal disorders.

The aim of the study was to assess the prevalence and intensity of pain in the musculoskeletal system in workers who regularly used a notebook computer in their professional work and to determine the influence of working conditions and time of work with a notebook computer.

The study covered 300 workers. Musculoskeletal disorders were assessed by the Nordic Musculoskeletal Questionnaire complemented with the VAS scale. Assessment of working conditions was made with the use of a questionnaire developed within the study.

The most frequent faults in the workstation organization included the lack of a computer table with adjustable keyboard tray / drawer, no adjustment of chair armrests, no possibility to use an additional keyboard. The most frequent musculoskeletal disorders among computer operators included: headaches, low-back pain and neck pain. The use of an additional keyboard reduced the intensity of shoulder pain.

Keywords: musculoskeletal disorders, notebook computer, working conditions

XRCC3 and ADH5 polymorphisms association with genotoxicity biomarkers in workers exposed to formaldehyde

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Formaldehyde is classified by the International Agency for Cancer Research as carcinogenic to humans (group 1). Epidemiological studies of occupational exposure have suggested possible links between the concentration and duration of exposure and elevated risks of leukaemia and other cancers, such as nasopharyngeal cancer. The cytokinesis-block micronucleus assay is used extensively in molecular epidemiology, and can be considered as a "cytome" assay covering chromosomal changes, such as micronucleus, nucleoplasmic bridges and nuclear buds. Several studies documented that the genes involved in DNA repair and maintenance of genome integrity are critically involved in protecting against mutations that lead to cancer and/or inherited genetic disease. XRCC3 participates in DNA double-strand break/recombination repair and ADH5 is an important component of cellular metabolism for the elimination of formaldehyde.

For all the genotoxicity biomarkers under study significant increases were found in the workers exposed than in controls. It was obtained significant results between XRCC3 polymorphisms and NBUD (p=0.042 and p=0.005). It was found that XRCC3 Met/Met (OR=3.975, CI 1.053-14.998) and XRCC3 Thr/Met (OR=5.632, CI 1.673-18.961) are risk factors in comparison with XRCC3 Thr/Thr. ADH5 polymorphism did not showed significant results for the genotoxicity biomarkers studied. The common limitations of the studies that report an association between genotypes and biomarkers such as MN are: the size of the study groups is usually too small to evaluate rare polymorphisms, and different studies; the allele frequencies for each genotype vary widely in different ethnic populations, and statistical analysis is often inappropriate and potential confounding factors are not fully evaluated.

Occupational exposure to poultry dust and the relation with respiratory symptoms

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Modern methods of poultry facility management require that workers spend a large proportion of the day in an atmosphere containing comparatively high levels of dust, gases and odors. All particles with size between 1-5 µm are considered respirable particles and, for that, it has the capacity to migrate along the respiratory tract. Studies of different industries showed the highest prevalence of work-related lower and upper respiratory symptoms and lower baseline lung function in poultry workers.

A study was developed aiming to assess occupational exposure to dust in seven poultry units located in Portugal, as well as to evaluate the existence of clinical symptoms associated with asthma and other allergy diseases by European Community Respiratory Health Survey questionnaire.
Besides measuring particles concentration, differentiation between size fractions was also performed (PM0.5; PM1.0; PM2.5; PM5.0; PM10) due to the importance in health studies, aiming to estimate dust penetration within the respiratory system and, consequently, their potential health effect. Measurements were performed with direct-reading equipment (Lighthouse, TSI). All measurements were performed near workers nose and during routine management of the facility, activity done frequently (2 a 3 times per day) and, cover a range of tasks performed sometimes at the same time. Some of the tasks are inspection, removal of unhealthy birds, weighing, beak trimming, vaccination and others. The presence inside the pavilion to perform each routine management has normally the duration of 30 minutes to 1 hour. During measurements, in all poultry units, workers were not using respiratory protection devices.

Considering particles' contamination, the ones with larger size were detected in higher concentrations particularly PM5.0 (particles of dimension 5.0 µm or less) and PM10 (particles of dimension 10 µm or less).There wasn´t found statistically significant differences (Mann-Whitney U test) between individuals that have the symptoms analyzed and who don´t have the symptoms considering particles exposure results. However, it is important to mention that there is a tendency for who have the upper and lower respiratory symptoms is exposed to higher concentration of particles. Moreover, 27.7% of all the inquired workers refer an improvement of their respiratory ability during the resting days and holiday.
The association between dust exposure and respiratory symptoms is consistent with the international literature. Considering the obtained data a better understanding of the poultry house environment is needed to develop intervention programs that aimed to improve and preserve the respiratory health of poultry workers.

Solid waste management in a biology institute: diagnostic approach with environmental education perspective

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At any solid waste management process, the first step it's the diagnostics realization to verify the studied area situation, enabling the construction of politics actions which could insure the environmental quality. This way, the different interactions between health and natural and anthropic environmental factors determine, condition and influence the human being life quality. In this sense, the identification and characterization of waste components are crucial in determination of the most appropriated technological alternative, from the segregation, gathering, transporting, reusing and recycling steps, to appropriate wastes' final destination.

The Higher Education Institutions exercise a prominent role in the technological development process, in the professional preparation and in the knowledge construction, being also responsible in the development of a society sustainable and committed to management process of wastes produced by his activities. In this sense, the universities which offer health areas courses like medicine, veterinary medicine, pharmacy, among others, usually possess laboratories, teaching pharmacies, teaching hospitals, clinics, specialized rooms and other units which generates health services waste.

Researches of waste management in health services accomplished that this institutions approach, mostly, only teaching hospitals, failing in other installations and, in some cases, dealing only with chemical waste management at laboratories. Towards the absence of environmental education programs, becomes relevant study how to implant politics and actions which aim at solid wastes management, in a diagnostically perspective of the current situation. This study aims to diagnostic the solid waste management of the Biology Institute – IB. The work was developed in September 2010 until October 2011, at Federal University of Pelotas' IB, Capão do Leão campus, Brazil. Were used as instruments in the data gathering direct observation and questionnaire appliance. With the obtained results it was possible to verify the lack of a Wastes Management Program at the IB.

The institute didn't present an appropriated structure for disposal of wastes stowage. Within the Federal University of Pelotas, particularly at Biology Institute – IB, the implantation of a wastes management program in environmental education perspective could contribute to environmental health, besides being potentiating the civic education at academic community.

Chemical wastes management at an agronomy university laboratory: health and environment

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It's estimated that 30% of health damages are related to environmental factors caused by sanitation inadequacy (water, trash and sewer), air pollution, natural disasters, biological factors (vectors, hosts and reservoirs), chemical and physical material exposure, among others.

The environmental questions are strongly aimed at large enterprises and at the most diverse industries, both from a legal standpoint, as from society pressure. However its usual the inexistence of these preoccupations at university space, particularly at laboratories which produces chemical wastes.

In this study were studied eight laboratories from the Agronomy course at Federal University of Pelotas. It was applied to teachers, administrative-technicians and students from Post-Graduation – a total of twenty-four collaborators – a questionnaire with seven closed questions which mean to identify the technical parameters of disorderly production of laboratorial wastes. The inquiries evolved the utilization of chemical products from the interviewee, identification of these products, the storage of the used reagents, destination of expired reagents, destination of wastes created at the laboratories, the storage of these wastes, and the volume created, besides searching to know if it's realized some of treatment in these wastes. In all cases it was present the utilization of some chemical substance, being the most of these substances acids. As the storage, it was found that the most of these wastes are stored at the laboratory, with two exceptions, where the storage is done at a warehouse. The expired reagents are normally still used or kept to gathering, however one case of undue discard was evidenced.

The answers regarding the destination of generated wastes were doubtful, with affirmations of discard at sinks and dumps, among others preserved to gathering, but also with affirmations that the gathering isn't done, and they feel disoriented for not knowing what to do. The storage of these wastes was registered as done in plastic and glass flasks, although the interviewees didn't know how to proceed, at some moment was examined a direct disposal in sinks and dumps.

Finally taking in to account the volume of produced waste, this proved to be less excessive, around one liter per month, with the exception of one of the laboratories which generates more than fifty liters per month. Only two of the laboratories affirmed that neutralizes the acids and bases produced. Despite the system currently used to deal with the produced wastes, it was possible to register the existence of an environmental apprehension at the interviewee.

Taking this into account, it is necessary the implantation of an appropriated management plan of wastes generated at the studied laboratories that, besides insurance the environmental health, also advance the students tenable formation.

Cognitive disorders and occupational exposure to organophosphates in French vine workers

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Biological and epidemiological data are in favour of an impact of exposures to the organophosphate insecticides on cognitive performances in humans. However, long-term effects of these pesticides remain debated, mainly because of limitations in exposure assessment in available studies**.** Our objective was to analyse the impact of organophosphates exposures in cognitive performances of vine workers enrolled in the PHYTONER cohort, using both qualitative and quantitative exposure parameters.

The Phytoner cohort, initiated in 1997, was based on the population of workers affiliated to the farmer health insurance agency in Bordeaux area. They had to work for at least 20 years at baseline in the vineyard setting (*a priori* exposed subjects) or in other agricultural settings not concerned by pesticides use (agricultural cooperatives or silviculture: *a priori* non-exposed subjects).

The analysis involved the subjects interviewed at the 4-yr follow-up between 2001 and 2003. Exposure to organophosphates from 1950 to the date of interview was assessed with cumulative exposure scores combining a historical crop-exposure matrix (PESTIMAT) and field exposure studies taking into account the characteristics of the farm, equipment and operator during treatment (mixing, spraying, equipment cleaning) and re-entry tasks. Five cognitive tests, administered at home by trained psychologists, were analysed in relation with exposure: the MMSE, the Benton Visual Retention Test (BVRT), the Trail Making Test Part A (TMT A), the Wechsler Paired-Associates Test and the Stroop Test (ST). Age, sex, nationality, educational level, alcohol drinking, psychotropic drugs use and depressive symptoms were taken into account in the analysis.

Among the 614 subjects analyzed, 443 (72.1%) were classified by the matrix as possibly exposed to at least one organophosphate (among 34 identified in the matrix) during treatment (N=336) and/or re-entry tasks (N=414). Pesticides exposure duration averaged 31.3 yrs (SD: 10.9 yrs). Eleven OPs were retained in the analysis according to the life-cumulated scores: azinphos, chlorpyriphos, demeton, diethion, fenitrothion, malathion, methidathion, mevinphos, parathion, phosalone and quinalphos. Median life-cumulated scores ranged from 27 to 271 mg, and maximal values from 75 to 865 mg. Exposure to these pesticides (ever vs never) was associated with low cognitive performances (OR from 1.90 to 2.48 for MMSE). Even though no dose-effect relationship was observed, a global trend to increased risk was observed with a 50 mg increase in the cumulative score, more pronounced with mevinphos (BVRT: OR=3.26, 1.54-6.88; TMT A:

OR=3.03, 1.39-6.62). Excluding pesticides poisoned or recently exposed subjects did not change the results. The risk of worsening performances between baseline and follow-up was significantly associated with ever/never exposure for the MMSE and with cumulative exposure for the ST.

Our results support the hypothesis that cognitive disorders observed in vine workers may be associated to specific exposures to OPs. Risk of cognitive disorders in subjects occupationally exposed to OP must be considered in order to detect a possible evolution towards dementia.

Work and health in a tobacco grower municipality, Brazil

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Brazil is the third largest tobacco leaf producer in the world and the first exporter. The relationship between farmers and tobacco companies is unequal: cultivation takes place at the so-called 'integrated system'. In this model, the industry controls the whole production process, including the supply of several pesticides used in the cultivation. The health impacts caused by that cultivation must be considered. Besides the production model and the strenuous workdays, those individuals, their families and communities are often exposed to multiple risk factors for chronic diseases, especially cancer, like the use of many pesticides, solar radiation and tobacco use.

Estimate the prevalence of risk factors for cancer in residents in a municipality in southern Brazil, 2007.

In a survey, 2.250 individuals with 15 years or more were selected, who answered a structured questionnaire to identify health and socio-economic conditions, agricultural labor, as well as exposure to carcinogens. For this research the variables selected were age, farm labor, sun exposure and protection, pesticide use, pesticide poisoning in life, depression, cigarette smoking and age of initiation of smoking.

There were 2044 (91%) respondents. The average age was 43 years, agriculture was the main source of income and 57% of individuals were farmers. Among farmers, 86% had worked in tobacco crops in the previous year and 75% started working until 13 years. Sun exposure with low use of protection was frequent (90%) to all respondents and 18% had been already diagnosed with depression by a doctor, at least once in life. The pesticide poisoning was reported by 25% of the respondents. Between farmers, 77% reported the use of pesticides. When asked to refer the most common pesticides used in crops, 54 diferent comercial names were cited. Those include mainly herbicides, like Glyphosate (cited by 89%) and organophosphate insecticides like Acephate (cited by 87% farmers). The global prevalence of smoking was 24%, but higher in the group of tobacco farmers (26,9%). Between this group, the early initiation age (under 15 years old) was also most prevalent (29.4%).

The results shows that this population is highly exposed to carcinogens and their health conditions deserves attention. The contact with pesticides since childhood is a reality in tobacco growing. Depression was relevant and more especific studies are necessary to investigate the relation between depression and tobbaco farming. It was also observed that smoking prevalence in this municipality is higher between tobacco farmers. Due to the relevance of the exposure to risk factors for cancer observed, the promotion of alternatives livelihoods to those families, focusing on crop diversification with no pesticide use are imperative.

Development of a risk assessment method and risk assessment of safety and health in printing industry

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The paper first deals with the elaboration of a risk assessment method in order to better assess the risk to the safety and health of employees. This method will be applied for risk assessment in businesses engaged in printing activities. Furthermore, the paper considers accidents occurring in the printing industry in order to pay special attention to such events in risk assessment. It can be said that the largest number of injuries occurs in the maintenance phase in printing shops with outdated equipment. Also, the major problem is the failure to comply with instructions and technical malfunctioning of equipment. In such companies exceeding physical stress and strain are present often inducing diseases of the spine, which then progress in time and cause serious health problems to employees. From the analysis of the accidents and collected empirical data on the processes in the printing industry, which the authors dealt with most, risks and hazards to the safety and health of workers in the printing industry have been identified. Since these risks and hazards are encountered in most other manufacturing branches like in chemical, mechanical and computer industries, which are an integral part of the production process in graphic industry, their identification, analysis and elimination are important for all these industrial activities individually. The paper presents one concrete risk assessment of safety and health of employees performed with the elaborated method. The results of the risk assessment by the selected method should not remain only in the form of calculated data, the goal is to find measures whose implementation will diminish risks to the safety and health of employees in the printing industry. Hence, measure are proposed herein to decrease existing risks and hazards, and after taking these measures the risk is significantly reduced. The proposed measures can be organizational, safety, and even structural, where structural changes are proposed regarding work equipment as well as the design of auxiliary devices and equipment that would be helpful to employees, and their application would clearly reduce the safety and health risk lowering it to an acceptable level. Therefore, the goal of the paper is to elaborate the health and safety risk assessment method for employees, detect dangers and hazards in the printing industry, assess the risk with this method and give suggestions to improve the current situation.

Key words: printing industry, risk assessment method, risk reduction measures, safety and health.

Safety assessment of macroscopic examination rooms in pathology laboratories

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Only the preservation of the best conditions for efficient work ensures the safety of the professionals. The Macroscopic Pathology Rooms (MPR) are of particular relevance in this context due to its exceptional characteristics and, therefore, its assessment is important in order to detect the necessary interventions to ensure the health and safety of the professionals.

Prepare a tool for verifying the safety conditions of MPR and apply it in 15 large hospitals in Lisbon. Evaluate the results obtained in order to assess the validity of the developed instrument.

Based on literature it was prepared a checklist of 69 items grouped into 9 categories (General Conditions; Floor; Walls; Hygiene/Safety; Benches/Cabinets; Formaldehyde Exposure; Grossing Workbench, Removable Equipment; Available PPE), yielding a score for increasing quality of 0-100 points. 15 MPR were assessed and the obtained data were analyzed by means of descriptive statistics.

The best score was 80,43 and the worst was 63,04 (mean=74,06; SD= 4,5) – image 1. It should be noted, positively, the Walls category, where 73.3% of hospitals had the highest rating possible, and for the negative, the category Formaldehyde Exposure, in which 60% of hospitals were classified as below the scale midpoint.

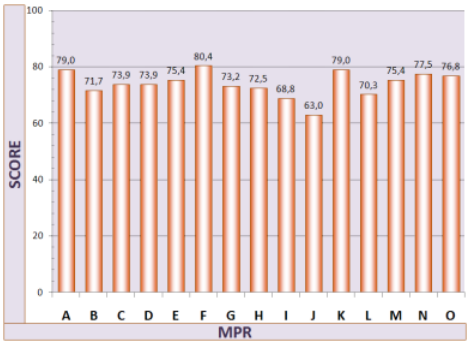

Image 1 – Scores of the 15 MPR assessed.

The results indicate that, in the studied laboratories, the MPR have acceptable conditions. However, some cases were identified that require urgent intervention concerning formaldehyde protection, which should be a priority for specific assessment and investment. The instrument seems to enable a proper appraisal of risks and their consequent elimination/mitigation, and it may give some added value for all who wish to evaluate safety in MPR.

Occupational Stress in Environmental Health Professionals

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Occupational psychosocial risks stressors are defined as aspects of the design, the work management, the social function and the organizational environment that have the potential to cause psychological or physical stress (National Institute for Occupational Safety and Health,2006).

Previous studies showed that professionals working in health care are exposed to a diversity of psychosocial risks that are an important cause of occupational stress (OS). The prevalence OS has been associated with the decrease of health, of quality of life and of productivity by the European Agency for Safety and Health at Work (2010). Although sharing with other health professionals many work psychosocial risks there is in the literature any studies on stress in Health Environment Professionals

This study aimed to identify the perceived degree of stress, the perceived degree of satisfaction and the occupational stressors (psychosocial risks) experienced by Environmental Health Professionals (EHP) working in the areas of Safety and Health (SH) at Work and Public Health (WPH).

A questionnaire, including the Professional Stressors Inventory (Santos 1999; Santos, Barros & Carolino 2007) and two subjective scales measuring Satisfaction and Perceived Stress was answered by a sample of 125EHP,

In this sample the individuals characterized their perceived degree of stress as medium/ high , referring as the most significant stressors "low salaries", "hierarchical disruption of the services," "lack of material resources in the services" and "lack of human resources in the services". Correlation analyses by Spearman correlation test found statistically significant inverse correlation (p-value = 0.02) between the perceived satisfaction with interpersonal relationship and level of perceived stress. Some differences were also found between the two groups (SH) and (WPH). Perceived stress and perceived satisfaction were also correlated.

These results indicate the need to extend the actions of primary and secondary prevention of stress to health professionals other than those traditionally dealing with patients. These actions should evolve better organization of work tasks as well as a more effective distribution of resources. . The results also show the importance work relationships and a moderate of work stress and indicate the need to improve those relations.

Falls in hospital environment – risks and consequences (case study from distrital hospital in Figueira da Foz)

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Falls are the most frequently reported adverse events in health centers with the consequences of a physical nature translated into injury directly caused by trauma, blunt the psychological fear of further falls, anxiety, depression and loss of self-esteem and are socially underlying the increased costs to human and technical resources, which translate into increased hospital stay and dependence of the wearer. This study aims to know the Risk Index fall of users admitted in the pilot study HDFF, EPE; to identify associations between fall risk and age, medications used, running condition and history of decline and examine the consequences of falls for the user and the institution. To meet the targets was done, a retrospective, descriptive whose sample was not probabilistic and was composed of 135 users. In carrying out the study prior to the collection of data based on individual consultation process on general file. The interpretation of statistical tests were based on the level of significance $\alpha = 0.05$, confidence interval 95%. The results point to users who consume drugs associated with the presence of risk, this was observed in 24% of consumers. Most of the people under study is a consumer of drugs (65%) of which highlights the consumption of benzodiazepines (38%) and hypotensive (34%). The opportunity to be in the presence of risk is 7.05 times higher for consumer users The users who reported having a running condition dependent (79%) were at risk, and users that revealed a history of fall, all were classified at risk. Users with an average age of 68 were classified as risk.Com complete this study it became apparent the influence of some factors associated with the risk that maintains continuous monitoring of users classified at risk of falling.

Occupational Health

Keywords: “Falls”; “fall risk”; “falls prevention”; “patient safety”.

Ergonomics, health and safety at work: a necessity for recyclable materials collectors

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According to the National Research of Basic Sanitation (PNSB), 30.390 people are working as collectors in Brazil (IBGE, 2008). CAPUCHA (1998) believes that these professionals are characterized by low life quality, and low skills; accommodated in circles of poverty, and adoption of marginal lifestyles. Therefore, while cooperatives are presented as a solution also becomes a problem for the profession, because the major difficulty faced is the issue of discrimination and exclusion from society that does not recognize them as a professional or associate them with urban sanitation, increasing the frame of social exclusion.

According ALBIZU (2008), there was little mention that the activity of recyclable material collector was regulated in Brazil in 2002 by the Ministry of Labor and is included at the Brazilian Classification of Occupations (CBO). It is expected that the projects of the WASTE SCREENING units where some collectors work has not been planned considering the minimum aspects of health and safety of working.

In general, we can infer that the main health effects of worker, by being exposed to an environment inadequate ergonomically are psychological and physiological disorders, serious damage to health because they produce changes in the body and emotional state, affecting their productivity, health and safety such as repetitive strain injury (RSI), musculoskeletal disorder related to work (MSDs), tiredness, muscle aches, hypertension, sleep disorders, etc. (OLIVEIRA, 2011).

The Alvinópolis' SCU (Screening and Composting Unit), a municipality in the state of Minas Gerais, Brazil, is currently used by an association of recyclable materials collectors. It was diagnosed that the local SCU situation is precarious. This proposed of the SCU readjustment with the ergonomic perspective aims to improve of the collectors working conditions and orientation as the personal hygiene and work.

The sectors were scaled with the goal of bringing functionality to the SCU reducing physical effort in materials handling, comfortable spacing of the layout and organization to promote improvement in work efficiency. Some sectors have been suggested to add economic value to the recyclables and organic. Was also scaled an effluent treatment system for the cleaning sectors water and a rainwater capture system. The project has a large area of roofs and a big potential to capture rainwater (and not potable water) for use in daily sectors cleaning. The support unit proposal includes male and female locker rooms, lunchroom, classroom and office that meet the regulatory standards of the work force in Brazil. The external circulation area has the visual pollution effect mitigated by gardening. The design suggests alternatives that aim to reduce or eliminate health problems related to this job and that the main ideas can be replicated in other SCU.

Occupacional exposure to *Scopulariopsis* sp. in poultry and swinneries' workers

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Airborne fungi, along with other micro-organisms, solid particles and volatiles, are constantly aerosolised in animals houses contaminated with organic materials. Microbiological composition of air, as a factor of ambient conditions in animal facilities can significantly influence performance, health and animal welfare. Also, there are numerous reports on health outcomes in occupants exposed to airborne microorganisms and theirs biologically active products. *Scopulariopsis* sp. is a common genus of mold frequently occurring in indoor environments. No species of Scopulariopsis are known to produce mycotoxins, but the most common species, *S. brevicaulis*, is able to degrade arsenic containing materials, releasing free arsenic into the environment. Exposures from *Scopulariopsis brevicaullis* have been associated with cases of occupational allergy. Considering the fact that an allergic reaction may occur with exposure to minute concentration of an allergen, mold indoor could create health risk for individuals occupying a determined setting. Furthermore, several *Scopulariopsis* species are also known to cause opportunistic infections, and *S. brevicaulis* is a well known agent of onychomycosis.

Aiming to estimate the prevalence and distribution of *Scopulariosis* sp.,and in order to evaluate its risks in causing potential health problems to the workers from animal production farms, seven Portuguese poultries and seven swineries were analyzed. A total of 83 air samples (through impaction method), 66 surface samples (swab sampling) and 28 samples of different floors' coverage (litter) were analyzed.

From the seven poultries analyzed, *Scopulariopsis* sp. was found in the air four of these explorations, with a frequency of 50.3% average. This genus was detected in 12 air samples, 10 surface samples and 10 samples from the birds' litter. Regarding swinneries, this genus was also found in the air of four explorations but with lower frequency than in poultries (21.1%). In this type of animal explorations, *Scopulariopsis* sp. was found in 18 air samples, 24 surface samples and only in one in the floor coverage. Despite the higher number of collection points positive to *Scopulariosis* sp. in the analyzed swinneries, higher counts of colony forming units were found in the air of the poultries (average of 3190 ufc/m^3 *versus* 217 ufc/m^3). Differences could be explained by the differences in the type of animal, different activities developed by the workers and also by the presence of higher counts of colony forming units detected in birds's bedding (an average of 53000 ufc/g).
Scopulariopsis sp. is isolated most often in association with otomycosis or onychomycosis, but it has been also associated with respiratory symptoms and occasionally isolated from drug addicts

and in association with lung conditions in immunocompromised patients. This study contributes to the knowledge of *Scopulariopsis* sp. frequency and distribution in Portuguese poultries and swineries. High amounts of this mold were detected in the analyzed settings and the obtained results show an eventual risk to their workers and an occupational health concern. This indicates the need to put a greater emphasis on prevention in subsequent environmental mycological control and periodic examinations of risk groups.

Waste-related occupational activities and respiratory effects

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There is evidence that exposure to solid waste is associated to several respiratory adverse health effects. However there are some controversies regarding the objectivity of the symptoms and the stratification of the risk inherent to the different occupations related to the management of solid waste. In addition, there is a lack of knowledge regarding the efficacy of technologic advances in the management of solid waste and the effects of implementation of individual protection equipments on the morbidity of urban cleaning professionals.
Evaluate respiratory threats due to the exposure to solid waste within different categories of urban cleaning professionals compared to each other and to a control group.
The representative groups of urban cleaning professionals were workers of Landfills, workers of Transfer Stations, Waste Collectors, Sweepers, Truck Drivers and the Control group. The control group was comprised of *Companhia Paulista de Trens e Metros* (State Trains and Metros Company) employees with work characteristics similar to those of the studied group such as open-air work and wage range, however without any contact with solid waste. All groups were comprised of males matched by age. All individuals were submitted to spirometry, analysis of serologic markers of allergic sensitization, and nasal cells analysis besides an interview about symptoms. Comparisons aimed at functions performed.
Two hundred and seventeen individuals were evaluated. No differences were found regarding reported symptoms and frequency of diagnosis of asthma and rhinitis among the groups. Remarkably, in spirometry there were no differences among all groups concerning respiratory parameters suggestive of obstructive respiratory diseases both before and after the use of bronchodilator. There was a significant difference when comparing nasal smears from the groups, Truck Drivers showed the highest percentage of neutrophylic and eosinophilic (p=0.002) infiltration. All groups had increased mean IgE levels, markedly the groups of Collectors, Sweepers and Drivers. The group of Waste Collectors had statistically higher IgE levels, only when compared to Transfer Station Workers (p=0.017). No differences were found among groups when comparing specific IgE levels for fungi antigens
The Truck Driver's group showed nasal smears suggestive of irritative rhinitis, more suggestive of exposure to diesel particle material from the truck engine than to waste products exposure in this group. There were no evidences regarding increases in symptoms, frequency of diagnosis of asthma or rhinitis, or spirometric findings suggestive of either chronic or transient pulmonary alterations among the urban professional cleaners when compared to the control group. In addition there was no evidence of allergic sensitization to fungi antigens in groups related to waste related activities, but there was high levels of IgE in all groups studied suggesting high proportion of allergic individuals in the sample groups.

Vaccination at construction sites in Rio Grande do Norte, Brazil

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The health worker today is synonymous with sustainable development, bringing improvements to the lives of workers and productivity for employers. In Brazil, there is now a large number of construction workers due to the country's economic growth and consequent "boom" real estate. However, besides being one of the most dangerous in the world, most of the workers have low education and poor vocational training, which results in high number of absences from work due to accident or illness.

The vaccine sensitizes the body's immune system, preventing the emergence of diseases caused by viruses and certain bacteria. Thus, it is the duty of health professionals to be attentive and willing to run the programs established to meet and promote the accessibility to the widest number of individuals, as well as pay attention to the risk factors involved in the work of the same.

This experience report aims to investigate the actual vaccination status found in some construction sites in the municipalities of Rio Grande do Norte, and analyze the performance of nurses.

From the vaccination campaign against hepatitis B and tetanus, held in workers at construction sites was possible to know the reality that target audience, beyond the position of their employers.

The results show the need for greater involvement of companies in compliance with NR 32. In relation to the immunization schedule, the main problems identified were related to the presence of multiple cards vaccine for a single person, which certainly led to repetitive doses and therefore higher financial costs, only an incomplete scheme for taking the first dose required in the contract. It was also observed that it was not given importance to the application of doses remaining to complete the immunization schedule. They were then promoted prevention and evaluation of assistance.

Study of accidents at work in a hospital: key to the integration of safety management in health facilities

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The type of work and the conditions under which it is performed are important determinants of the risk to workers' health. The latest statistics and studies about occupational injuries in health care, point to an increased incidence of accidents at work with a consequent increase in absenteeism and financial burdens attached to them.

In order to characterize the accidents at work and its financial implications in a medical facility in the central region of the country, we conducted a descriptive, correlational, retrospective analysis including a period of four years (2005-2008), using the data from occupational health service, social reports and annual reports from each year of study.

The results showed a progressive increase in the frequency index and the index of severity of accidents. The highest number of accidents occurred in nurses working in shifts. The injury is declared over the bite and hands the hardest hit, however efforts are excessive and neck / back pain that produce a greater inability to work with the consequent increase in days of absenteeism. We found that the time in days lost gradually increasing over the four years, as well as financial implications.

To minimize the consequences inherent in work accidents, top managers must take steps to ensure a better quality of life of professionals, thus contributing to an improved quality of service delivery in health facilities, implementing a service of Hygiene, Safety and Health at Work effectively preserving human resources and providing safe staffing of healthcare / patient.

Occupational Health

Keywords: Accidents at work; Safety at work; Management of health facilities.

Poultry workers fungal exposure and sensitization

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Poultry workers are exposed to various fungi and fungal volatile compounds. Occupational exposure can occur by inhalation of dust generated during the handling and processing of contaminated crops and feeds. Several studies suggest that the intensity of exposure determine clinical relevance.

Allergy reactions require previous sensitizing exposure. In this study we want to evaluate the risk of allergy due to fungal exposure in a poultry workers population triggered by the interaction of immunoglobulin E.

A descriptive study was developed in order to assess indoor and outdoor air contamination caused by fungi and particles in seven poultry units. Two different mixes commercialized by ImmunoCAP®, Phadia were used to monitor specific IgE antibodys to fungi in forty seven workers - mx2 (*P. notatum*, *C. herbarum*, *A. fumigatus*, *C. albicans*, *Alernaria alternata*, *H. halodes* and mx4 (*A. terreus*, *A. niger*, *A. flavus)*. A questionnaire was performed to the workers in order to obtain personal and clinical data from the workers, including previous history of respiratory symptoms, personal history of atopy / previous allergic symptoms, tobacco smoking and time of exposure to that environmental setting. Sensitization to fungi was defined as at least one positive result to specific fungal allergens.The statistical analysis was done with resources to frequency analysis and Chi-square test.

We found that 3 (6.3%) poultry workers were sensitized to fungal allergens. Despite the high number of fungal colonies detected in the air, surfaces and litter of the poultries, there was no positive association ($p>0.05$) between fungal contamination and sensitization to fungal antigens. As described in others studies, our results suggest the “healthy work effect” due to the fact that the atopy status affects the selection of occupation, with less workers with previous allergies employed in poultries than should be expected.

Occupational noise in an aluminum joinery: a case-study in a factory, Portugal

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In 2009, the enterprises with less then 10 workers represented 95,6% of the total of empresarial units, reflecting a business sector based in microenterprises in Portugal. This data suggest the importance of controlling the occupational environment, specially the hygiene and safety at work in these companies. Most of these enterprises are inserting in a familiar structure. This kind of companies reveals several difficulties in implement good practices in hygiene and safety at work. In this field, the role of the Health and Safety Technician is very important to advice during the project design of a factory/industrial building, to follow the evolution of the implementation of the measures and to ensure that the good practices are being implemented. This work presents a case-study of occupational noise in a factory of aluminum joinery in the district of Santarém, Portugal.

Measures were taken according ISO 9612:2009 and Decree-Law n.º 182/2006 (6th September) using a calibrated Integrating Sonometer Cesva, Model SC160 and the calibrator Cesva Model CB004 in eight equipment/machine, during 3 minutes and 3 times. In order to obtain the representative values of LCpeak and Laeq, the presence of a worker was needed to perform the normal use of the machines like sawing, cutting and laminating the aluminum pieces. The microphone was positioned in a distance between 0.10m to 0.30m in front of the most exposed ear using a weighting filter A and C in rapid response. When measurements present a Laeq, Tk of 80dB(A), a noise spectra in 1/8 bands were performed to select hearing protectors.

Results show that all equipment have very high sound pressure levels, in a range of 80-110.8 dB(A) for Laeq and 102.2-126.3dB(C) for LCpeak. After the evaluation of personal exposure it was verified that, personal level exposure for all of six workers without hearing protectors were above of superior action threshold value of 85 dB(A). For LCpeak, no worker exceed 135dB(C), which correspond to the low action threshold value. For the eight workstations analyzed to define the best hearing protection, only for two the actual protection showed to be acceptable; for the others, the protection was excessive (five cases) and sufficient (one case).

In this case-study, the factory works in an open space, where the machines are distributed along the industrial building. According to this evaluation preventive measures should be taken in order to decrease the personal exposure. However it is easier to invest in collective protection measures in the project of the building, like encapsulate the area where the machines work and put them all together. The way that this building operates puts all workers exposed to occupational noise.

Exposure to aflatoxin B1 by inhalation – Poultry case

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Aflatoxins (B1, B2, G1, and G2) are toxic metabolites produced by the fungus strain *Aspergillus flavus,* commonly found in soil and agricultural commodities. Toxicity has been extensively investigated for the most important, namely aflatoxin B_1 (AFB_1).

Although a body of evidence supports the hypothesis that exposure of humans to the mycotoxin AFB_1 is an important etiological agent in hepatocellular carcinoma, both epidemiological and laboratory evidence also point towards the respiratory system as a potential target for AFB_1 carcinogenesis.

There are few reports which deal with exposure to airborne AFB_1 through inhalation. Residue levels of airborne AFB_1 were detected in agricultural dust. It has been reported that the respiratory system's pneumocytes are capable of metabolizing AFB_1 to its ultimate carcinogenic form.

Occupational Health

The primary objective of this research was to assess exposure to AFB_1 of poultry workers.

A total of 31 workers at 7 poultry units located in Portugal were included in the study. Additionally was consider a control group (n=30) that developed administrative tasks and without any kind of agricultural activity.

Measurement of AFB_1 in serum was performed by ELISA. The samples were treated with pronase (Merck), wash in a Column C18 and purification was made with immunoaffinity columns (R.biopharma), specific for AFB_1.

Results obtained in poultry workers varied between 0.24 and 4.23 ng ml^{-1} with eighteen workers (58.6%) with detectable levels of AFB_1. All the controls results were below LOD.

This occupational setting is known has related with high exposures to particles and fungi. Probably particles are the vehicle of AFB_1 exposure by inhalation.

AFB_1 represents an additional risk in this occupational setting that must be addressed, assessed and prevented. In the poultry units consider, no prevention measures were applied, since workers did not wear respiratory protection devices or did not operate in confined environments, and the pavilions have only general ventilation systems.

Assessment and control of acoustic noise produced by magnetic resonance scanners: Preliminary results

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In recent years several technological changes have occurred, linked to a growing need for comfort and promotion of healthy workplaces. In this context a special attention is needed for the acoustic and noise control in hospitals and/or clinical institutions. The aim of this study is to explore the assurance of safety in the Radiology environment and if there are any effective planning in the architectural and construction approach of the Magnetic Resonance Imaging (MRI) units related to the acoustic noise produced by its gradient's system.

This was an exploratory study with two components: quantitative and qualitative, both aiming:

a) To evaluate the effectiveness of Planning, Construction and Installation of the hospital buildings, namely the MRI rooms;

b) To check the adequacy of the materials choice used in the shielding, according to the room space and equipment´s characteristics and according to the specificities of these devices and of the clinical examinations;

c) To assess the agreement between the ergonomics, physical infrastructures of the room and equipment characteristics installed;

d) To know the individual protection measures implemented to shield radiographer's against noise.

The quantitative empiric component: done through measurements with an integrating sonometer with the possibility to analyse the noise frequencies by octave bands at different key places in the Magnetic Resonance room. The measurements will be performed during the acquisition of the noisier MRI sequences such as Echo Planar, Gradient Echo and Fast Spin Echo. The MRI scanners in study have between 20mT/m to 40mT/m slew-rate.

The qualitative empiric component was composed by exploratory interviews to Engineers from manufacturers companies, Hospital Managers and Radiographers and included, also, a review of documents such as records, query of construction projects and specific ordering information, among other documents considered important.

After, the intersection of the information has the objective to validate all the collected data.

The results until now acquired, indicate that there is adequacy in the materials choice used in the shielding of MRI units, architecture and engineering planning; moderate consistency between organizational measures, engineering and personal protection plans; attention over the premises of MRI in order to comply with the regulations of the radiographers occupational noise exposure.

The knowledge sharing and communication between experts from the three involved areas during the construction, acquisition and installation of scanners was not found.

The quantitative component is still under analysis, however from the partial results and based on the results obtained by previous studies, it is assumed that the noise exposition to the Radiographers are into the range defined as secure by the guidelines, except in special cases. For example, the maximum peak value registered by the author Simões, Z., 2009 was 108.3dB, the limit is 140dB and by the author, Algarvio, A., 2010 the maximum L_{ex},8h obtained was 67dB(A) and the first action level starts at 80dB(A).

In conclusion, although the noise values found were within the limits, this can happen casually because there isn't an effective planning linking the knowledge of all the experts involved since the beginning of the project till the scanner functioning.

The effects of exposure to a mixture of organic solvents on menstrual function and hormonal changes in female workers

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Today, menstruation disturbances of women are a common complaint both in industrialized and in developing countries. It is clear that public health level of a society is widely impressed by women's health status. Various studies suggest that evaluation, prevention and treatment of menstruation disturbances should be given priority in the women's health programs. There is some controversy in the literature regarding the effects of occupational exposure to organic solvents on menstrual function. This study aimed to investigate possible effects of occupational exposure to organic solvents on women's reproductive health when measured as the prevalence of menstruation disturbances and amounts of hormone tests.

425 female workers of a pharmaceutical factory were enrolled in a cross-sectional study. Required information for the study such as demographic, medical and occupational data was collected through medical records and direct interviews and was documented in a questionnaire. Also blood samples were taken from all study subjects to evaluate the hormones levels including FSH (Follicle Stimulating Hormone), LH (Luteinizing Hormone), TSH (Thyroid Stimulating Hormone) and prolactin levels. According to the standard environmental measurement of organic solvents present at working units (Formaldehyde, Phenol, N-Hexane, and Chloroform), workers were divided into three groups including non-exposed (207 women), low exposed (145 women) and high exposed (73 women). These groups were compared in terms of menstruation disturbances and the values of hormonal tests.

Based on definition, 61 workers (14.4%) were suffering from menstruation disturbances. Generally speaking, the frequency of menstruation disturbances in the exposed groups was significantly higher than the non-exposed group (P<0/05). Also a meaningful difference were found among the workers of three groups in terms of mean values of hormonal tests including increased FSH, LH and TSH levels and decreased Prolactin level in the exposed groups. Odds ratio (OR) for menstruation disturbances in the high exposed group was 9.69 (95% CI=4.02-23.35) and in the low-exposed group was 3.40 (95% CI =1.56-7.38) compared to the reference group.

In this study mean length of menstrual cycle, mean length of menses, amount of blood flow and the prevalence of menstruation disturbances including long menstrual cycle, Irregular menstrual cycle and bleeding during menstrual cycle were significantly higher in the workers who were exposed to a mixture of organic solvents. Also the mean values of hormones tests were different between the exposed and non-exposed groups. These findings suggest that occupational exposure to a mixture of organic solvents may cause menstruation disturbances and hormonal changes in female workers of a pharmaceutical plant. However further studies are needed to confirm this theory.

Evaluation of genotoxic damage in healthcare personnel exposed to waste anaesthetic gases

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Occupational exposure to the waste anaesthetic gases is possible for the personnel working in the operating rooms and as well in recovery units unless protective measures are not implemented. In order to assess genotoxic effects of possible occupational exposure to the mixture of anaesthetic gases (nitrous oxide, sevoflurane, and desflurane) cytokinesis- blocked micronucleus assay in lymphocytes has been used in the present study. As a marker of exposure, urinary sevoflurane levels were analyzed.

Our study group comprised 34 operating room (OR) and 12 recovery unit (RU) staff from the same hospital. Control group was chosen among the same hospital's staff those without anaesthetic gas exposure (n=19). Urinary sevoflurane of OR staff (n=33) was found at ND-1.18 µ g/L_{urine} level and of RU staff (n=11) was at 2.78-10.16 µg/L_{urine} level. Sevoflurane levels were not significantly different between OR and RU staff ($p>0.05$). Two of the OR personnel had sevoflurane levels below the limit of detection (LOD). Control group sevoflurane levels were found to be below the LOD.

Mean (± SD) levels of micronucleus frequencies (‰) in OR and RU staff were significantly increased versus control group (6.27 ± 3.50, 7.18 ± 3.28, 3.53 ± 2.39; respectively, $p<0.05$) whereas there was no significant difference between OR and RU staff. As a conclusion, there was genotoxic effect due to occupational exposure of the waste anaesthetic gases. Furthermore, urinary sevoflurane seemed to be a good biomarker of possible exposure to the waste anesthetic gases for hospital staff.

Thermal Stress due to Cold Exposure

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The type of cold exposure encountered at work may come from exposure to cold air, immersion in water, or through touching cold surfaces. Accordingly, cooling may target different areas of the body. Discomfort may be a distraction factor and can affect the performance of tasks requiring concentration and vigilance, and may increase the risk of occupational accidents and injuries. Cooling can also be restricted to the extremities (head, hands and feet) and is often enhanced by touching or handling cold objects. This type of cooling is especially common in occupational activities and involves a significant risk of cold injury.

The aim of this research was to determine if the workers of a frozen food industry, whose activities were developed in a cold environment, were exposed to stressful or discomfort induced situations, due to thermal environment.

The frozen food industry activities were developed at temperatures below 12ºC. However, in some work areas, workers were exposed to negative temperatures (-24.5ºC). The environmental parameters (air temperature, mean radiant temperature, air velocity and humidity) and skin temperature of both hands were measured. For positive temperatures it was used PMV-PPD Index and for negative temperatures it was applied IREQ Index.

The PMV-PPD and IREQ Indexes revealed that the workers weren't exposed to thermic stress by cold, due to a high clothing insulation and high metabolic rates. On the other hand, PMV-PPD and IREQ Indexes showed that some workers presented thermic discomfort, derived from cold exposure, but also from an increase of the temperature, due to excessive clothing insulation.

Cold indoor work can result in different adverse effects on human health, which will decrease performance, work productivity and increase the occurrence of accidents and injuries. It should be considered that intervention in these kinds of settings is difficult, since temperature maintenance is needed to ensure product quality. In this case, a better planning of the work activities, training, a profounder knowledge regarding metabolic rates involved and an improvement in technical measures like heating or reduction of cooling by protective clothing[(3)], contribute to not only better preserve human health and reduce accident risks, but also to improve work performance.

Lighting conditions in assembling electrical industry

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Proper lighting is a prerequisite for obtaining a good working environment (Miguel, 2010).

Poor lighting may increase the risk of accidents (Veitch, 2001 apud Pais & Melo, 2011; Reinhold & Tint, 2009) and could also cause a variety of symptoms.

Apart from the advantages in the health and welfare for the workers, good lighting also leads to better job performance (faster), less errors, better safety, fewer accidents and less absenteeism. The overall effect is: better productivity (van Bommel, 2006; Veitch *et al*., 2008 apud Pais & Melo, 2011; Begeman, 1997 apud Morghen *et al*., 2009).

Good lighting includes quantity and quality requirements, and should necessarily be appropriate to the activity/task being carried out, bearing in mind the comfort and visual efficiency of the worker (Boyce, 2003; Picolli *et al*., 2004 apud Pais & Melo, 2011).

The variables that determine a good working visual environment are: the even distribution of luminance, proper lighting, the absence of reflections, the right direction of light, no flicker, appropriate choice of lamp color, availability of natural light (Eklund, Boyce, Simpson, 2001 apud Reinhold & Tint, 2009).

A descriptive study was developed to review lighting in assembling electrical industry. Fifty-four workplaces were evaluated. In the evaluations of lighting levels, the measurements were carried out for a sufficient time for the stabilization of the value of the level of illumination. To developed the measurements it was considered the day period they were made and the weather, because this two variables can influence the measurement results.

The measurements were made using a meter lux brand Gossenr, model Mavolux 5032C.

In some workplaces evaluated the type of activity implies performing demanding visual tasks with small details (control and test), it should be provide values of iluminance between 1000 to 1500 lux, while in other workplaces evaluated implies performing tasks with normal visual medium details (assembly, crimping, packaging), the values of iluminance must ensure from 500 to 750 lux [Norma DIN 5035 (1990)]. It was found that in the majority of the workplaces the results are below the normative recommended values.

In the workplaces evaluated, the majority has general lighting with localized, either in workplaces with normalized values, or in those who are below the normative recommended values.

Lighting levels shall not exceed the recommended, because it can cause accidents and also cause excessive energy consumption and undesirable.

Results show that lighting conditions are below recommended guidelines. According to the observations made corrective measures should be taken.

In addition to the natural lighting should be provided artificial lighting adequate for the type of tasks to perform and it is recommended to periodic cleaning of the lighting network, translucent tiles and walls.

The impact of a dialogic process of design for the workers activity

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The objective of this paper is to investigate the role of ergonomics in increasing occupational health using the dialogic process of design in order to approaching project and use.
The case used occurred between the years 2004 and 2006 and resulted in a doctoral thesis defended in 2011. The data are composed by the design process for furniture conceived to the Brazilian Post Office attendance counter.
The request for ergonomic intervention in the company came as an answer to the various numbers of lawsuits referring to the compliance with safety and medical standards of the Brazilian labor laws and same articles of the Standard Regulation number 17 of the Brazilian Labor Ministry.
Analyzing the medical certificates sent two bigger fields of problems were found: musculoskeletal diseases and mental disorders. The complaints related to physical constraints were fundamentally attached to the worker postures, because of the limitations imposed by the furniture. In relation to mental disorders, these were related to the attention demanded (cognitive load) and responsibility (psychological load).
The ergonomic project hired by action used the method of Ergonomics Analysis of Work (EAW). From the diagnosis of the ongoing situation the project was directed to a purpose building up a new service counter (brand new drawing). It stands out that the present paper will describe and discuss the results for the *modus operandi* of the workers.
On the characterization of risk factors of the task there were identified 13 categories of products and, in them, 23 distinct processes. During the analysis it was noticed that the task of client attendance could be divided into stages according to predominance of them in all activities done by the attendant. So, the positioning of each body segment was verified during the following fragmented stages: picking up/delivery of material from the client; reading/writing on postal object; stamping; picking up empty boxes; storing the postal object in the specific box; typing; cash operation; organizing documents; and, organizing products.
The practice of ergonomics cannot only participate in the processes of conception, but also influence them in favor of the conception of an effective working situation (related to the productive action efficiency) and compatible with the health of workers. The dialogic relations occurred during a social process of design determinate the analysis of the problem and the decisions that impact in the way someone can use an object. The changes, knowledges and conflicts between the actors materialize in the object the project options came from the consensus, but they never ended because these differences cannot be totally equacionated. Thereby, it comes to a conclusion that the design process will be the interface of a person and

the world, between a person and other people and this can benefit the intelligence and invention of the workers in the activity.

Inhalation exposure to cytostatic drugs - sampling techniques and analytical methods

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The primary source of human exposure to anticancer drugs is from their use in the therapy of cancer, commonly called chemotherapy. Cytostatic drugs possess toxic properties and may therefore cause mutagenic, carcinogenic and teratogenic effects.
People employed in the manufacture, preparation and administration of the drugs are exposed to cytostatic drugs. Dermal and inhalation routes are the likely routes of exposure to anticancer drugs in healthcare facilities. Although, hand-to-mouth exposure, accidental needle sticks, spillage and generation of aerosols may also contribute to exposure.
For this reason, it is important to monitor occupational exposure to these drugs with standardized sampling techniques and analytical methods.
For this review work were considered articles published after 2000 devoted to cytostatic occupational exposure, and dedicate to the assessment of exposure by inhalation.
The common analytic method utilized for study exposure by inhalation is the High Pressure Liquid Chromatography (HPLC). It can detect a variety of compounds with a single analysis with high sensibility and accuracy. However, it has limitations in the detection of 5- fluorouracil. Sampling method normally used is an electrical pump with solid adsorvent (Anasorb 708 for instance). However, when Anasorb 708 was used, limitations for doxorubicin drug were observed. This method can be also used with UV radiation. In this case it can detect 5-fluorouracil with a good precision and accuracy, unless this drug is derivatised.
Other analytic method that can be used is Gas Chromatography Mass Spectrometry (GC-MS). However, factors as humidity, adsorption and desorption can influence the results of the method because they can interfere in the behavior of the compounds. It's necessary more studies about this issue.
Considering other possible analytical resource, the LC- MS/MS doesn't have limitations. It has showed a high precision and accuracy to cyclosphosphamide. However its necessary more studies to compare and recognize if it can be used to detection of others compounds as well.
With the application of API 3000 triple quadruple mass spectrometer, it wasn't detected levels of inhalation exposure. This doesn't mean that the work environment wasn't contaminated. It´s possible that this method can't detect low concentrations of compounds, in other words, it isn't sensitive enough.
We can conclude that doesn't exist the perfect method, because it will always depend of the aim of the study. However, the HPLC method is the most embracing for compounds detection. The API 3000 triple quadruple mass spectrometer is the least adequate for monitoring inhalation exposure.

Key-words – cytostatics; occupational exposure; exposure by inhalation, sampling techniques; analytical methods

Preparing a check-list for assessing the safety conditions of autopsy rooms

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Safety and hygiene conditions are of increasing concern in pathology laboratories, including its essential autopsy rooms. An autopsy is a time consuming procedure that may involve contact to several biohazard risks, in most of the cases unknown to the technical staff that perform the autopsy. As so, all the autopsies should be considered highly infectious and all the standard precautions should be followed. Only creating a secure environment, giving the clinical autopsy room proper work conditions at both collective and individual level, it will ensure the safety of professional workers that execute autopsy related tasks. In this context, the assessment of existing conditions in the autopsy room assumes upmost importance, allowing a proper appraisal of the risks and its consequent elimination/mitigation.

The aim of this project is to prepare an instrument to check the most relevant aspects of safety and hygiene conditions of the clinical autopsy room in Anatomic Pathology.

An extensive and intensive literature review allowed the collection of relevant information, which after treatment will allow the preparation of a simple but complete checklist that will enable the assessment of the overall quality and safety of clinical autopsy rooms.

It was prepared an instrument with 86 items grouped into twelve categories: general conditions; doors; ventilation; floor; walls; cleaning; personal protection equipment; collective protection equipment; waste - image 1.

The items are classified according to the scale: no (0 point), incomplete (1 point), complete (2 points), thereby obtaining a quantitative result from 0 to 172, that afterwards is commutable to a 0-100 more user-friendly scale.

		N	I	C	NA
General Conditions	1 Physically separated autopsy room	0	1	2	
	2 Large open room	0	1	2	
	3 Total area is adequate to the number of benches	0	1	2	
	4 Area dedicated to visitors	0	1	2	
	5 Locker room exclusively for workers	0	1	2	
	6 Locker room has washing sinks	0	1	2	
	7 Locker room has showers	0	1	2	
	8 Adequate provision of fixed equipment	0	1	2	
	9 Adequate storage system of instruments	0	1	2	
	10 Adequate general artificial light	0	1	2	
	11 Adequate artificial light in detailed work areas	0	1	2	
	12 Separate area for corpses	0	1	2	
	13 Refrigerated area for corpses	0	1	2	

Image 1 – Checklist - General conditions category.

The obtained checklist sustains face validity and is underpinned by relevant and extensive bibliography that enables it, despite having no statistical validation proven yet, to constitute certainly an asset for those who want a simple checklist for quantitative assessment of quality and safety in their clinical autopsy rooms.

Formaldehyde and Health in workplace. Genotoxic Damage

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Formaldehyde (FA) is a world high-volume production compound with numerous applications to which approximately 900,000 European workers are exposed. Given its economic importance and widespread use, many people are exposed to FA environmentally and/or occupationally.

Listed, since 2004, by IARC as *human carcinogen*, FA status was recently revised by U.S. government who reclassified this compound *as known to be a human carcinogen*.

Both reclassifications are based on sufficient evidence of carcinogenicity from studies in humans, supporting studies on mechanisms of carcinogenesis and experimental evidence in animals. Epidemiological studies demonstrated a causal relationship between exposure to FA and cancer. Consisting findings of increased risks of certain types of rare cancers were found among workers with higher measures of exposure to FA (exposure level or duration). Studies have also suggested that FA may affect the lymphatic and blood systems and that exposure to FA may cause leukemia, particularly myeloid leukemia, in humans. Occupational exposure involves not only individuals employed in the direct manufacture of FA and products containing it, but also those using these products, namely in pathology and anatomy laboratories where is commonly used as a fixative and tissue preservative. Indoor air analyses have shown that the levels of airborne FA in pathology and anatomy laboratories exceed the recommended exposure criteria. In these settings, absorption of FA occurs mainly through inhalation. Inhaled FA primarily affects the upper airways; the severity and extent of physiological response depends on its concentration in the air.

In order to assess the genotoxic effect of long-term occupational exposure to FA a group of pathology-anatomy workers was tested for cytogenetic damage, by micronucleus (MN) and sister chromatid exchange (SCE) tests, and DNA damage, by comet assay. Genotoxic endpoints analysis may be of great interest in risk assessment of occupational carcinogens because they precede by a long time the potential health effects, thus offering a greater potential for preventive measures. Air sampling was performed in worker's breathing zone for representative working periods and 8h-time weighted average (TWA) was assessed. Genotoxic endpoints were significantly higher in the exposed subjects when compared with controls.

Data obtained confirm an association between genetic damage and occupational exposure to FA. Such results along with the recent implications of human carcinogenicity, point out for the need of close monitoring of FA exposures. Implementation of security and hygiene measures as well as good practices campaigns may be crucial to decrease risk.

Accidents in construction sites

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The construction industry is one of the most important of the Brazilian economy, one of their largest generators of jobs, but these are often informal and unsafe.

In many works of smaller size, working conditions are precarious, causing numerous accidents, with fatalities and serious injuries and cause damage to companies with lawsuits.

This study examined the working conditions of works of medium construction sites and identified the main aspects involved in accidents at work in these places, detecting procedures and hazardous locations and suggesting ways to reduce accidents.

The results show the difficulty of employers and employees in the use of safety equipment and lack of knowledge of security techniques.

Occupational Health

Artistic labor in childhood: qualitative study in occupational health

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In Brazil, because of the constitutional prohibition of labor before the age of 16 and the absence of law that sets limits and conditions to protect the health of the young artist, court orders have authorized the participation of children and adolescents in artistic and advertising productions, based on the international standard and the judge´s subjective criteria. The study aims to describe the activity of the young artist and its possible impact on the child´s development, according to the reports from such youth and their parents. Data has been gathered through a qualitative exploratory research by interviewing 25 individuals and three days of directed observation. This survey heard 10 young artists, between the ages of 10 and 13, and their mothers, individually interviewing them with a semistructured script. Interviews were also openly conducted with 5 other adult professionals also belonging to the artistic segment. The observations were made back stage of soap opera recording sets that had characters that were being played by children, and also at talent scouting events. The empirical data analysis was done using the Hermeneutic-Dialectic method. The results show that young artists comes from different socioeconomic classes, that besides the parent´s initiative to promote the start of the child´s artistic career, there are also cases in which the motivation comes exclusively from the child or teenager, and that is common the existence of a close relative of the young artist that would have liked to have experienced working in the artistic segment. Bio-psycho-social health effects have been reported both, positively: increased self-esteem, improved learning skills, and higher culture acquisition; and negatively: low self-esteem, elevated self-criticism, poor nutrition, sleep disorders, inability to attend family and school commitments, deficits in school performance and damages relationships.The study of the organizational aspects of this segment not only shows evidence that child participation in the artistic segment does in fact have the characteristics of labor and that there is no special care to adapt the production process to the needs of the young artist, but also that relationships are established in an atmosphere of pressure, competition and vanity, and that the accompanying mothers are aware of the presence of risks. The law is often disregarded due to lack of court permits or due to the fact that the accompanying parent is not allowed to remain in set to supervise the child artist during testing, recording or during a presentation. This study recommends that the subject should be regulated with specific rules to protect the health and safety of young artists, so that it could base public policy for this sector, as surveillance and actions to promote the health and wellness of this population.

Fast-growing fungi: a problem to be solve to achieve the characterization of occupational exposure to fungi in cork industry

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Chrysonilia sitophila is a common mould in cork industry and has been identified as a cause of IgE sensitization and occupational asthma. This fungal species have a fast growth rate that may inhibit others species' growth causing underestimated data from characterization of occupational fungal exposure.

Aiming to ascertain occupational exposure to fungi in cork industry, were analyzed papers from 2000 about the best air sampling method, to obtain quantification and identification of all airborne culturable fungi, besides the ones that have fast-growing rates.

Impaction method don't allows the collection of a representative air volume, because even with some media that restricts the growth of the colonies, in environments with higher fungal load, such as cork industry, the counting of the colonies is very difficult. Otherwise, impinger method permits the collection of a representative air volume, since we can make dilution of the collected volume. Besides culture methods that allows fungal identification trough macro- and micro-morphology, growth features, thermotolerance and ecological data, we can apply molecular biology with the impinger method, to detect the presence of non-viable particles and potential mycotoxin producers' strains, and also to detect mycotoxins presence with ELISA or HPLC.

Selection of the best air sampling method in each setting is crucial to achieve characterization of occupational exposure to fungi. Information about the prevalent fungal species in each setting and also the eventual fungal load it's needed for a criterious selection.

Are musicians exposed to excessive noise in Portuguese orchestras?

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Noise exposure is broadly recognized as one of the most frequent risk factor at industrial settings, however, for musicians the problematic of noise exposition is not well characterized. Previous studies showed that musicians, in particular orchestral musicians, could be exposed to high sound levels, which can result in hearing damages. These injuries have a negative impact on its performance due to the strongly dependence of their audition system. However, the concern about the exposure of these professionals is reduced. Some studies tried to characterize the exposition of musicians in some orchestras. However, there are no studies for Portuguese orchestras that characterize the exposure of musicians. Therefore, this study is a first attempt to analyse the noise exposures of musicians from a Portuguese orchestral, in order to understand their risk of hearing loss. Rehearsals of 7 different repertoires were analysed. Test subjects were selected in accordance with their position in orchestra. Participants were requested to wear noise dosimeters during the entire rehearsals. The microphone was located on the left or right shoulder of the test subject, according the more exposed ear. In the case of string instruments, the microphone was positioned on the opposite shoulder of the instrument. A sound meter was used to analyse the conductor exposition. Values of Peak noise level and Equivalent Continuous noise level were collected. The results showed that the sound levels vary with the instrument, the repertoire and the number of musicians. Values of equivalent continuous sound pressure level vary between 65.0-87.6 dB(A) for strings, 84.9-96.7 dB(A) for woodwinds, 87.0-97.4 dB(A) for brass, 85.9-91.8 dB(A) for percussion and timpani, and 77.2-86.3 dB(A) for conductors. Higher Peak noise levels were found for percussion and timpani (129,6-135 dB(C)). These results show that in the course of rehearsals, the musicians of the orchestra analysed are exposed to high sound levels that can lead to hearing damages. Among the musicians analysed the percussion and timpani musicians show particular preoccupation, because besides the high noise levels obtained, Peak noise levels achieved the lower exposure action level presented in Decreto-Lei nº 182/2006. The results obtained in this study indicate that more attention to these professionals is recommended. This study is still in course, including more exposure sources in to determine their levels of exposition, comparing individual exposure levels with guidelines.

Perception of health conditions in workers of a mining in the city of Pedra Lavrada-PB, Brazil

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Mining presents itself as a major source of income that drives many townships in the State of Paraiba. The municipality of Pedra Lavrada located in the Seridó of state, is no different, since the mining has been in development for over 50 years.

Understand the general health conditions of workers at a mine in the town of Pedra Lavrada, Paraíba.

This is a quantitative and qualitative research which included interviews with 20 of the 42 mine workers through structured questionnaires that addressed aspects of occupational safety, health, compensation and environmental perception.

The extraction of minerals such as limestone, feldspar, quartz pink, mica, ruby, onyx-black ore, tantalite, talc, uranium, among others, should give better life to the miners, however, one sees a neglect of these workers, bringing with it numerous health problems. Concurrent mining practices, some impacts of physical, biological and social are observed. Most of the mine workers when they use any safety equipment, use only gloves. Most of patients reported being constantly and suffer injuries. Also reported not having medical care from the company they work. Although 76% of workers admit that their activity produces damage to the environment and their health, social and economic conditions of most families in the town limit access to alternative employment.

Therefore, changes the ecological balance and the impacts of human activities in the mining areas have been causing damage to the health of miners

Occupational exposure to styrene and its various health effects

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Styrene is an aromatic hydrocarbon and a monomer used in the production of a variety of polymers and rubbers. The major uses of styrene are in the reinforced-fiberglass plastics industry, the butadiene–styrene rubber industry, and in polystyrene manufacturing.

In humans, styrene metabolism involves oxidation by cytochrome P450 monooxygenases (CYPs) to styrene-7,8-oxide, which is further metabolized to mandelic acid (MA) and phenylglyoxylic acid (PGA) as the major end products. Styrene-7,8-oxide is an epoxide responsible for the genotoxic effects of styrene exposure, and detoxification by means of epoxide hydrolase (mEH) and glutathione *S*-transferases (GSTs)

We made a revision about occupational exposure to styrene and its various health effects.

Health problems include nervous system disorders, respiratory symptoms, dermatological diseases, loss of colour vision, live, kidney, auditory, reproductive organs and heart disorders.

In addition, genetic and mutagenic toxicity were reported on styrene exposure.

Occupational Health

Integrating between ergonomics and design: the case of cabin decoking in an oil refinery

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The production complex Petroleum is composed of a chain of processes ranging from exploration, drilling, production, refining, storage, transportation to the distribution of final products. The refineries are composed by a group of units that transform the crude oil in a variety of derivate products, as automotive petrol, airplane petrol, diesel, cooking gas, natural gas, petcoke, characterized by the presence of painfulness and accident risks, since the activities of the operators are quite complex and dangerous.

This study was developed from a partnership between the research group in ergonomics Ergo&Ação of the Federal University of São Carlos (UFSCar) and an oil refinery, located in the state of Sao Paulo, Brazil. The origin of this demand is related to the occurrence an accident at work in the refinery's petcoking unit, specifically in the decoking operation.

In an attempt to understand the work situation and the mechanisms of this operation that triggered the accident, it has become a partnership between the research group on ergonomics and the company to, with the approach of ergonomics activity, systematizes the operator actions and uses their perception in the design process of decoking operation.

The objective was to identify potential risk factors to health and safety of the decoking operation in order to institute preventive measures, through interventions in the workplace.

The theoretical assumptions were based on the method of Ergonomic Work Analysis, aligned to corporate guidelines and standards of Health, Safety and Environment (HSE) of the refinery. The method is divided in: (a) Analysis of the demand, (b) Analysis of the task, (c) Analysis of the activity, (d) Diagnosis and (e) Development of solution.

The outcomes indicated by analysis of the study demonstrate the presence of intense vaporization during the petdecoking operation with the opening of the reactor. This process forms a cloud throughout the premises, preventing the operator's view. The jet of steam, at the opening, it is high pressure and temperature reaches 200°C, characterizing the situation as high risk involved in serious injury to the operator. The process of analysis, development and solution proposal triggered as a cabin for the permanence of the operator during the operation, considering the determinants found in the work situation by ergonomists and designers for the company, combining indicators health, management and production.

The analyzes involving accidents at work in productive situations are not trivial, since the prevailing view of blaming the victims. This article concluded that the overall understanding of the work situation enabled us to identify the real constraints experienced by the operator in the task of decoking. It is noteworthy that the integration between ergonomists and designers of the company, promoted from the approach of the ergonomic analysis of the activity, favored

the process of revealing the real needs of those who perform the work, culminating in preventive actions to reduce these risks.

Disclosing effects of tobacco smoke on occupationally exposed workers at Lisbon restaurants

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Tobacco smoke is increasingly recognized as an occupational hazard to workers. Partial smoking restriction in Portuguese hospitality venues, such as restaurants, does not sufficiently protect these workers against Second Hand Smoke (SHS), whatever protective measures are used. Therefore, they are at increased risk for developing chronic respiratory diseases such as chronic obstructive pulmonary disease, asthma and lung cancer.

The aim of the present work was to study by proteomics the biological effects of SHS on the plasma proteome collected from occupationally exposed workers.

After Indoor Air Quality (IAQ) assessment of a group of restaurants located in Lisbon, 96 workers of these places were evaluated for acute exposure to SHS, genotoxic lesions and respiratory function. To investigate global changes in the plasma proteome, plasma was prepared from the same blood sample used in the genotoxic study and pooled according to average age, level of genotoxic lesions, smoking habits and SHS exposure. There were four conditions in study, each represented by three biological replicates: Smokers and Non-smokers exposed, or not, to SHS. Samples were then depleted of the 14 most abundant serum proteins (serum-14) using a multiple affinity removal system (MARS).

Depleted fractions were analysed by 2-D Fluorescence Difference Gel Electrophoresis (DIGE) approach. Labelled proteomes were submitted to isoelectric focusing in 24cm-IPG strips pH4-7 (GE Healthcare) prior to SDS-PAGE electrophoresis. Acquisition and analysis of gel images were carried out on a typhoon imager (GE Healthcare) and SameSpots software (NonLinear Dynamics), respectively. A total of 967 spots were detected and, after volume normalization, 6.3% of spots presented variation of its expression levels. Differentially expressed spots across the groups in study were selected for protein identification by MALDI tandem Mass Spectrometry (MS). Identified proteins were annotated according to molecular function and associated pathways to disclose altered mechanisms induced by SHS on exposed workers.

This study represents a global assessment of IAQ in Lisbon smoking entertainment places and health effects on exposed workers. Most importantly, it may contribute to the better understanding of pathogenesis mechanisms due to SHS exposure. In addition it may lead to the discovery of specific biomarkers for occupational SHS-exposure that might precede respiratory diseases on their employees and promote more effective therapies.

Exposure to fungi in cork industry: potential occupational hazard

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Cork is a light, porous and impermeable material extracted from the bark of some trees. It is in manufacture of stoppers for wine bottles the main application of cork. It is estimated that the area occupied by cork oaks in the Iberian Peninsula is around 33% in Portugal and 23% in Spain. The world production of cork is focused in the south Europe, with Portugal being the most important producer followed by Spain. According to Companies Directory more than 100 manufactories from Portugal has their branch associated with the preparation and fabrication of cork.

Cork workers are at risk for developing diseases of the respiratory tract such as occupational asthma and Suberosis, a form of pulmonary hypersensitivity due to repeated exposure to mouldy cork dust.

In this review study papers from 2000 were analyzed to better understand which fungi species are associated with occupational disease in cork workers.

The most prevalent fungi species in these workers that are associated with those occupational diseases are *Penicilliumglabrum, Chrysoniliasitophila* and T*richodermalongibrachiatum*.

Therefore, a specific knowledge about occupational exposure to fungi in the cork industry is the key to better understand the related diseases and to define preventive measures. Given the importance of this occupational setting in Portugal is essential to evaluate the combined exposure of fungi and particles and their metabolites. Further studies concerning exposure assessment to fungi and particles in the cork industry must be developed.

Respiratory symptoms of rural workers exposed to biomass burning

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Brazil is the largest producer of ethanol from sugarcane in the world, and this activity is of great importance in national economic scenario. However, part of the sugarcane is still burned to facilitate harvesting, exposing millions of people, especially rural workers. This action releases toxic gases into the atmosphere and prolonged exposure can cause respiratory disease. So the objective of this study was to evaluate the perception of respiratory symptoms rural workers directly exposed to the burning of sugarcane. Were evaluated twenty-three male rural workers (age = 25 ± 4.7 years, BMI = 24 ± 3 kg/m2), non-smokers, from Sugar and Ethanol Company located in the western state of Sao Paulo in Brazil. Evaluations were performed in the pre-harvest and six months after harvest. The perception of respiratory symptoms was assessed using the respiratory symptoms questionnaire, which consists of eight questions easy to interpret and rapid implementation. Statistical analysis was performed using the Goodman test to compare the qualitative variable, the level of significance was $p \leq 0.05$. In the pre-harvest issues related to nasal congestion and difficulty breathing when there is dust or climate change were the most related by sugarcane (21.7%). At the end of the harvest, eleven of rural workers (47.8%) complained of difficulty breathing when there is dust or climate change, and the item with more complaints during this period. Compared with the pre-harvest, at the end of harvest, items itchy nose, sneezing crises, rhinorrhea, nasal pathology, drugs for respiratory disease, difficulty breathing when there is dust and climate change had increased the number of workers who complained of symptoms, however, this difference was not statistically significant. For items allergy nasal stuffiness and the frequency of workers who complained remained unchanged. Our results suggest that after six months of harvest, the frequency of workers who complain of increased respiratory symptoms and other studies in this area are extremely important to better understand the impact of burning sugar cane on the health of rural workers exposed directly.

Evaluation of lung function abnormalities prevalence in poultry workers

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Poultry workers can be at an increased risk of occupational respiratory diseases, like asthma, chronic obstructive pulmonary disease and extrinsic allergic alveolitis.

A descriptive exploratory study was made to assess the prevalence of lung function abnormalities in 46 poultry workers.

An individual questionnaire (smoking habits; history of lung disease; respiratory symptoms; exposure history) was applied and spirometric parameters were measured using the MK8 Microlab spirometer that allows visualization of the flow-volume loops. Spirometries were performed according to ATS/ERS 2005 guidelines and calibration was done before test session. The following parameters were assessed: forced vital capacity (FVC), forced expiratory volume in one second (FEV1), FEV1/FVC% and forced expiratory flow at different FVC volumes (FEF 25, FEF50; FEF75 and FEF25-75). For interpretation purposes we used the fixed cut-off of 80% of predicted rather than the 5th percentile. The test results were classified as following: i) obstructive ventilatory defect if FEV1/FVC% was below 80%; ii) restrictive ventilatory defect if FEV1 and FVC were below 80% with a FEV1/FVC % equal or above 80%; iii) inespecific ventilatory defect if FEV1/FVC was below 80% and if FEV1 and FVC were below 80% or if FEF's were below 60%.

Data collection was done on seven poultry farms in a total of 46 workers, 69.6% males and 30.4% females. Five workers (10.9%) had previous lung disease so they were excluded from analysis. The remaining group had an average age of 44.5 ± 12.41 years. In this group, 43.9% were smokers and 56.1% were non-smokers. The duration of exposure (years of practice) was on average 18.3 ± 11 years. Data from non-smokers and smokers were analyzed separately. Descriptive statistics was used due to the reduced sample size. Prevalence rate of obstructive ventilatory defect is higher in individuals with longer exposure (31,7%) whether they are smokers (17,1%) or non-smokers (14, 6%). No significant differences were found concerning the duration of exposure, in spirometric parameters, in both smokers or non- smokers.

Both smokers and non-smokers with higher exposure to that occupational setting showed a higher prevalence rate of obstructive ventilatory defect. No other lung function abnormalities were found. However, this was probably related with the small sample size. Further studies concerning influence of occupational exposure to fungi and particles in workers lung function must be developed in Portugal. Spirometry high quality technical standards must be applied to assure a good discrimination between ventilatory patterns and to allow comparison between different studies.

Ergonomics in construction

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The production process of a construction work is held outdoors, exposing workers to different weather effects. Work is in a large percentage done by hand, which is the reason why the worker has to perform high physical efforts. In developing their activities workers adopt awkward postures, repetitive movements and handle high weight and size loads, factors that provide short or long term serious health problems. This study presents an ergonomic risk assessment in a set of tasks performed during various stages of construction of a house, specifically in the activities of tiling, projected plaster, masonry, formwork and opening channels for piping with an electric hammer. Research tools used were a semi-structured questionnaire, two check-lists, photos and footage, and data were further processed by Ergolândia 3.0 and SPSS 17.0 software. The methods used to characterize postural risk during the various activities were OWAS and RULA methods. It can be concluded that in general there are postural high-risk situations for workers involved in the activities studied, resulting from incorrect habits in carrying out their tasks. It was found among the range of activities assessed that projected plaster has higher action levels, mainly in tasks of lath walls and ceilings. Formwork also provides relevant risks to workers and the task of opening channels for piping with electric hammer generated a disagreement among results obtained by both methods. It was also found that the applicability of the RULA and OWAS methods, separately, in this sector has limitations, particularly with regard to the fact that on one hand the RULA method gives greater emphasis to more static and repetitive activities, directing its action mainly to upper limbs, and on the other hand the OWAS method has a more general assessment, easily identifying risk situations. The joint application of the RULA and OWAS methods to construction may overcome the limitations identified in the individual assessment of each of the methods.

Occupational noise in buses

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The purpose of the present study is to assess the noise levels that the bus drivers are exposed during their activity. At the same time, was explored the influence of factors such as age, brand, occupation and type of windows of the vehicles, on the measured noise levels.

It is a cross-sectional study where were measured the levels of LAeq and LCpeak in 35 vehicles that travel in routes in the city of Coimbra and nearby places. The measurements were made using a dosimeter.

The mean values of LAeq, LCpeak and Lex,8h were, respectively, 76.59dB(A), 122.22dB(C) and 66.18dB(A). These results show that, on average, the exposure limit and values of action upper and lower, established by the Portuguese legislation (Decree-Law n.182/2006).

This study did not establish the existence of a significant relationship between age and the vehicle noise levels.

Vehicles with windows that allow the opening appear to be acoustically more comfortable than those whose windows do not allow the opening, but this factor also did not reveal a statistically significant relationship with the noise levels.

Spectrum analysis of noise levels per frequency of octave band reveals the predominance of noise in the frequencies between 500 and 2000 Hz (speech) and, the lowest values, correspond to the frequencies of 31.5 to 200Hz and 4000 to 8000Hz (vehicle).

The study revealed the existence of a clear relationship between the number of occupants and the measured noise levels. Although the noise levels do not exceed, on average, the limits prescribed by law, were very superior to the values recommended by World Health Organization (WHO).

'Technological imbalance', the production of occupational risk agents and the expertises of unsanitary conditions

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Companies extends often lack of problematization of workers ' health, the level of hygiene and occupational safety, build strategies that focus on production, i.e. activities are planned, programmed and executed according to production deadlines, in absentia, of how much and how can they affect workers. It follows within the productive cycle the ' technological imbalance impacts generator ', offending the performance of potential individual or collective protection systems which aims to bring the aggressive agents and employees, resulting in exposure to occupational risk agents – physical, chemical, biological, radiation, flammable and electricity among others, determining lawsuits by exposure to risks. The forms of social control are governmental (legislation, enforcement, trading), trade unions (pressure, negotiation) and civil society (public prosecutors, public prosecutors). When those collective ' fail ' instances, workers left, seek their individual rights. In these circumstances, the judiciary appears as the last instance of social control, unfortunately, more to compensate for any damage already caused or to obtain a right provided for in the legislation. Justification: one of the points of relevance to the study is increased by the interest in procedural remedies associated with the movement extended to expert reports for verification of work in unsanitary conditions and/or dangerousness in accordance with the Brazilian legislation, established by the Act № 3.214/78.

A documentary exploration of lawsuits coming from the Labor Forum of Campinas/Brasil - 15th Region, containing procedural instructions. Thus, thirty cases were selected in five of the twelve Labor Courts in the region, contemplating the documentary analysis of the application, the defense, the expert report, the impugnation, the technical assistant's opinions, the litigant's questions and the sentence. Following, we selected the qualitative variables which were sorted, tabulated and structured. Quantitative data was arranged in initial petition, report, appeal and sentencing forms.

As a result of the research was able to know what are the branches of economic activity involved in judicial expertise, their participation and awareness of different degrees of enterprises in relation to environmental risk considering the Brazilian legislation. For the 30 cases studied, it was companies risk grade 3 the largest citation in demand for additional risk with 19 citations, then risk firms 2 showing 9 employers, thirdly risk firms 1 cited in 5 cases and finally companies with risk degree 4 with participation in 4 processes for legal demands.

It has been observed that the judgments tend to consider the expert arguments noting the presence of insalubrious agents, thus, confirming the right to the hazard pay, and generally, the low control over working conditions with the persistent exposure to health risk agents.

Airborne microorganisms associated with plastic sorting facilities

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Numerous sectors are potentially exposed to biological agents. However since they are rarely visible, the accompanying risks are rarely recognized. The waste management sector, where there is an increased risk of handling material in decomposition, is one of the 10 principal emergent activities associated with exposure to biological risks according to the European Agency for Occupational Health and Safety.

In this study some data obtained from four enterprises of the sorting sector concerning the airborne microorganisms is presented. Data was collected from two different working environments, critical (sorting) and non-critical (administrative area) and a control point (outside) during a period of nine months.

Total concentration of airborne bacteria and fungi were determined as well as the prevalent species that could be identified. Fungi counts exceeded largely bacteria counts mainly in the critical areas. The correlation between the level of airborne bacteria and fungi and local temperature and humidity was also analyzed.

Evaluation of knowledge, attitude and practice related to standard precautions of physicians and surgeons in a healthcare unit

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Health workers in dental clinics are exposed to several biologic hazards through contact with body fluids such as blood, saliva or aerosols, so it is important to assess the frequency that accidents occur with these fluids. Both directly and through sharps, the type of exposure, the number of accidents and the affected body parts. The way to avoid infection and illness from these accidents with biological material can be influenced by hand washing and the use of Personal Protective Equipment. The sample consisted on 71 health professionals from dental clinics chosen for convenience and studied by a questionnaire. The study was Level II and descriptive and correlational. It was found that there were more accidents with biological material at the level of the mucous membranes (50%), the more frequent biological materials were blood and aerosols with 30,6%, the most affected body part were the eyes (57,5%) and the most common treatment after the accident was washed with water and saline (50%). It was also found that more accidents occurred in men (56,25%) and the category of highest number of accidents was the dentist (33,8%). We have reached the conclusion that there is still the occurrence of a high number (22,5%) of accidents with biological material in dental clinics.

Occupational Health

Development of a specific tool for measuring safety climate in the furniture industry

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The furniture industry represents a significant impact in the Portuguese economy. However, it is a sector that has a reduced professionalization in terms of management, marketing and trade policies, and with low qualification and undifferentiated workers. Besides, the number of work accidents in this industry sector is also high. This high number of accidents is a consequence of several factors, namely the specific risk of the sector, the stakeholders' low safety concerns, the lack of machine maintenance, and lower workers qualification. In the last years, several programs to increase the competitiveness of this industry have been implemented. Therefore, it is important to analyse the state and progress of the safety performance in this industrial sector. In this context, safety climate have been referred as a relevant measure for monitoring safety conditions. It refers to shared perceptions and attitudes among members of an organization regarding safety at a given point in time, and it is seen as a product/sub-component or an indicator of the organization safety culture. Regarding safety climate measure, previous researches have given rise to different assessment instruments/tools, i.e., instruments that included different dimensions and items. The factor structures used in the instruments are dependent from different characteristics, such as the considered items, used scales and the sectors of activity. Other important aspect to take into account about these tools, in order to compare safety culture among the companies, is the need to include items related with specific safety features of the sector in analysis. Therefore, it is important that the development of the tool is in accordance with the specific characteristics of the sector under consideration. Therefore, this paper aims to describe the development of a tool to measure safety climate on Portuguese furniture companies.

The first version of the tool, called Safety Climate in Wood Industries (SCWI) questionnaire, was developed. It included two main parts. The first part comprised workers' demographic questions, such as age, gender, department/sector, professional activity, number of years that works in the company, and involvement in past accidents. The second part included the items for measuring safety climate. The items formulation was based on a pragmatic approach, i.e., based on results of previous research that were combined constructing a new questionnaire.

So, the items and scales were developed on the basis of a literature review of available questionnaires. Items related with organizational and group levels are included. Some items are related to the main features of the sector, in particular to the main risk factors, in order to allow a comparison among companies. The considered items covered areas of management, safety

system, risk, competence/training, work pressure, and career. The level of agreement with each item was assessed by means of a five-point Likert scale. This tool is still at the first stage, i.e., in the design of a preliminary version. In the following stages, some pre-tests of the preliminary version will be implemented, in order to develop the final version.

Work, production and wear for the manual harvesting of sugarcane in Brazil

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The production of sugar and ethanol, both derived from sugarcane accounts for the main agricultural products in Brazil, with tendency to increase in order to search for a substitute fossil fuels, the sugarcane currently occupies about 2% of arable land in Brazil.

The manual harvesting of sugarcane, which is still employed at half of national production requires significant physical demands of workers, such as exposure to high temperatures, repetitive movements and cadence of intense work aggravated by a payment-for-production system with cutting goals up to 10 tons per day. The painfullness of the process has been associated with deaths due to exhaustion of workers in the sugarcane plantations in São Paulo state, Brazil.

To analyze the influence of organizational determinants of work on the wear-out of the manual harvesting of sugarcane. Grounded in ergonomic work analysis as a method to understand the difficulties encountered in work situations, were used to evaluate the heart rate by reference to the daily production and systematic observation for association of variables in the software Captiv 3000, at three moments in a same sample 41 workers during a crop of sugarcane.

It is observed in each of the three periods, that the effects of increasing the production of cardiovascular load was statistically significant, demonstrated the same for the entire period of the crop. Considering the sum total of estimatites, it can be stated that the increase of one ton of sugarcane increases cardiovascular load in 0.81%. By adjustment model can estimate that for a production of 15 tons daily, the cardiovascular load will be 40.47%, surpassing the 7% limit suggested by the literature. Being also the average daily production of workers as the three times was 10.45 tons.

Using the Captiv, it was found that the worker did 1209 bends and 442 rotations lumbar spine during 107 minutes of observation, in other words, a stunning average of 11.29 bending by minute or 1.88 flexing by 10 seconds. The highest average cycle in the sugarcane harvest was 6.7 seconds, it is noteworthy that the cycles less than 30 seconds represent risks of bony joints lesions. The effective work takes 94% of the time, only 6% of the time used for activities such as drinking, eating and moving from one place to another. It was also observed too much exposure to high temperatures and humidity, because the heat overload limit has been exceeded 80% of the days measured from the early morning and early afternoon.

It is concluded that the influence of production and pay per ton of wear are crucial, since under the financial incentive, workers crossed their physiological limits, endangering their health.

It should be noted that payment by production system contradicts the current Brazilian legislation, once the system of performance evaluation for the purpose of compensation must

take into account the effects on the health of workers. Therefore, recommends, the change in the form of remuneration in this sector.

Sleep quality and the influence in the arterial blood pressure and body mass index in flight crew

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Fatigue is an important factor in aviation, and is associated with sleep loss. Sleep deprivation has an effect on cardiovascular regulation through the autonomic nervous system, leading to a higher arterial blood pressure (ABP). Several hormones are associated to sleep, namely leptine, therefore there is some evidence that the sleep deprivation may induce obesity.

This study attempts to demonstrate that sleep quality is associated to higher ABP and body mass index (BMI) in flight crew.

343 flight crew members completed an anonymous questionnaire in order to access flight experience and sleep variables (subjective evaluation of sleep quality, latency and efficiency in the last month). For sleep efficiency we related the time that they actually slept with time they spent in bed. We considered decreased sleep efficiency less than 90% and increased sleep latency more than 30 minutes. We defined high BP as equal or higher than 140 mmHg for the systolic arterial BP (SBP) and/or equal or higher than 90 mmHg for the diastolic BP (DBP). The BMI was considered above the normal when higher than 25 Kg/m^2.To evaluate the association between variables we used the Qui-Square test and the t-student test to compare means (α = 0,05).

This study included 343 crew members with between 21 and 60 years of age (mean 40,7 ± 11,3 years), 50,7% were males and 49,3% were females. According to the questionnaire data, in the last month 48,8% slept less than 7 hours per night, 62,9 % had a low sleep efficiency, although just 10,8 % had a increased sleep latency. We found a mean value of 25, 3 Kg/m^2 for BMI, 37% were overweight and 14,1% were obese, class I. 24, 3 % of subjects had SBP higher than 140mmHg and/or DBP higher than 90mmHg. No association was found between the BMI and the sleep efficiency (p=0, 55 > 0,05). No statistical differences were found when comparing mean values of BMI in subjects with normal sleep efficiency and decreased sleep efficiency (p=0,67 > 0,05). BP and sleep efficiency were also evaluated and we noted that there is no association, nevertheless we found a statistical difference in the SBP (p=0, 03 < 0,05) and DBP (p=0,04 < 0,05) between the groups.

With this study we demonstrated that a significant percentage of aircrew had high BP and an increased BMI, although there is no significant difference between the mean value of the sleep efficiency within the BMI groups. Concerning the SBP and DBP we did find statistical differences between the groups with normal and decreased sleep efficiency.

Key Words: sleep quality; blood pressure; body mass index; flight crew

Occupational Health

Occupational exposure in a contaminated estuarine environment epidemiological study

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Previous environmental studies on Sado estuary indicated high concentrations of heavy metals (such as Cu, Zn, Ni, As, Cr, e Pb) on its sediments due to industrial contamination along with non-point anthropogenic sources.

Although considerable investigation has been done on environmental contamination assessment and its effects to ecological systems, in this particular geographical area no study relating the health effects due to exposure to heavy metals was ever conducted.

Thus an epidemiological study, was implemented in a small fisherman community living in Carrasqueira Village at Sado Estuary (exposed population) and in Vila Nova de Mil Fontes- VNMF (non exposed).The results to be presented reflect the analysis of occupational exposure comparing both populations.

A cross-sectional study was designed and data was collected through an epidemiological questionnaire. Face to face interviews of selected individuals was done during June and July 2011. Participants, from all ages and sex, were selected by simple randomization, using the medical registrations lists of local Health Centers. Dimensions measured in the two groups included among others i) Exposure factors related to levels of contaminants, including socio-demographic, occupational, leisure habits and hobbies, ii) Route of contamination (with special attention to subsistence fishing and farming) and iii) Health effects.

To each respondent was required to describe the tasks inherent to their actual or past job. From this description indicators of a potential route exposure to contaminants were created. It was considered direct exposure (fishing inherent tasks); indirect exposure (agriculture inherent tasks), other routes of contamination (tasks with other sources of contamination such as painting). The absence of the previous exposures indicates that no relevant exposure existed.

Statistical analysis was performed using descriptive analysis and associations were tested using Chi-squared test. A 5% significance level was used in all the tests.

A total of 202 participants were included in the study (102 in Carrasqueira and 100 in VNMF) and no significant differences were observed in age distribution ($p=0.267$), but there were significant differences in the educational ($p<0.001$) level and occupation ($p<0.001$).

Professions like fishers and agricultures are more likely to have higher risks of exposure to estuary river contaminants and were more common in Carrasqueira.

The participants of Carrasqueira reported a significant higher proportion of tasks inherent to their actual job, promoting direct (48.8%) and/or indirect (30.0%) exposure to contaminants ($p<0.001$ and $p=0.006$ respectively). There were no differences in the other routes of contamination ($p=0.511$). On the opposite VNMF participants were not exposed to any contaminant route. Similar results were found in the analysis of tasks in previous professions.

Also the period of time that was spent in the fishers and agricultures activities in Carrasqueira was higher than in VNMF (about 90% of individuals had more than 8 years of exposure, $p<0.001$).

On exposure epidemiological studies the selection of non exposed population is critical to avoid bias. The results obtained showed that VNMF population was a good selection since they differ from Carrasqueira in the exposure indicators.

Quality of sleep in flight crew and the influence of flight experience

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Flight crew´s sleep is recognized as critical to alertness and safety. Fatigue is an important factor in aviation, and is associated with sleep loss and shift work. This study attempts to demonstrate the association between sleep quality and flight crew experience.

343 flight crew members completed an anonymous questionnaire in order to access flight experience and sleep variables (subjective evaluation of sleep quality, sleep latency and sleep efficiency in the last month). For sleep efficiency we related time that they actually slept with time they spent in bed. We considered decreased sleep efficiency less than 90% and increased sleep latency more than 30 minutes. Concerning flight experience we defined two groups with the following variables: hours of flight per month (1: less than 35 and 2: more than 35) and years of activity (1: less than 10, 2: more than 10). Statistically we applied the Qui-Square test to evaluate association between variables and to compare groups the Mann-Whitney test (α= 0, 05).
This study included 343 crew members between 21 and 60 years of age (mean 40,7 ± 11,3 years), 50,7 % males and 49, 3% females. According to questionnaire data, 48,8% slept less than 7 hours per night, 62, 9% had low sleep efficiency, although just 10,8 % had a increased sleep latency. No association was found between flight hours per month and the sleep efficiency (p= 0,378 > 0, 05), there was however an association between sleep latency and flight hours per month (p=0.013 < 0,05). Concerning years of activity and the sleep variables, sleep efficiency is not associated (p=0, 08 > 0, 05) but the sleep latency is (p=0.01 < 0.05). When comparing groups of hours of flight per month, there is no statistical difference in sleep efficiency (p=0,816 > 0, 05) and in sleep latency (p=0,276 > 0, 05). There is also no difference in sleep efficiency (p=0,642 > 0, 05) and in sleep latency (p=0,391 > 0,05) between the groups of years of activity.

Even though there were no statistical differences nor associations found between the hours of flight per month and years of activivity in sleep efficiency, we did find an association in sleep latency. Through the descriptive analyse we found a significant percentage of crew members that showed poor sleep efficiency and half of them slept less than 7 hours. The large age amplitude of the sample could compromise the results knowing that both subjective sleep evaluation and sleep patterns are influenced by age. For further studies and to access an objective data of sleep, a polysomnography should be performed as well as the evaluation of sleepiness should be considered.

Key Words**:** flight crew; sleep quality; flight experience.

Thermal conditions in the HORECA sector

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The hotel, restaurant and catering (HORECA) sector employs a large number of people in the European Union and have a great importance in the economy of several EU countries. This sector include hotels, pubs, restaurants, contract caterers in various industrial and commercial premises, fast food takeaways, cafes and bistros and are associated with a number of risk factors; physically demanding work, exposure to high noise levels, hot or cold work environments, cuts, burns and falls. Exposure to hot thermal environments is common in this sector, mainly due to the presence of machinery and cooking equipment that produce heat (e.g. ovens and stoves). Besides that, inadequate ventilation may increase the poor thermal conditions in this type of establishments. High temperatures can cause thermal discomfort or heat stress and may also increase the probability of work accidents occurrence, promote behavioural disorders and reduce work performance. Thus, this study aimed to evaluate thermal parameters and to assess occupational exposure to heat stress in the HORECA sector.

The study was conducted in 8 establishments located in Porto, during the spring of 2011. The examined establishments are particularly popular to a great number of customers and the amount of food and food related products that are produced for consumption during this period is proportionally high. The methodology applied in this study was based on: the analysis and observation of structural and operational characteristics of the establishments by the application of a checklist, the assessment of thermal parameters (air temperature, natural wet bulb temperature, relative humidity, globe temperature and air velocity) and the determination of the WBGT index. The period and duration of measurements, the estimation of metabolic rate and determination of the WBGT index followed the ISO 7243:1989. The values of monitored parameters were compared with the current evaluation criteria: (1) air temperature: 18°C -22°C and (2) relative humidity: 50%-70% (Portuguese reference range-Decree-Law No. 243/86 of August 20th); (3) WBGT index: 28°C (ISO 7243:1989, reference values for persons acclimatized to heat and metabolic rate class 2).

The results showed that, regarding to air temperature, all establishments had average values above 22 °C, ranged between 23.8 °C and 28.3 °C. In terms of the relative humidity, it was found that 80% of establishments analyzed obtained average values below the lower limit of the recommended range. The lowest value obtained for this parameter was 40.2% and the highest was 56.0%. The air velocity values varied from 0.01 m/s and 0.11 m/s. For WBGT index, the results obtained are above the reference value set for these activities (28 °C), revealing that

none of the establishments are configured to heat stress conditions. The highest value obtained for WBGT index was 24.8 °C that can be explained by high air temperature (28.1 °C).

It is suggested that the correction of the ventilation rates and conditions of these establishments will improve the thermal conditions and they will bring the values to the optimal levels as indicated by the law.

Molecular Identification of pathogenic fungi in a waste-sorting plant

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Management of solid waste releases a wide range of chemical and biological pollutants with potential adverse health effects. There is increasing evidence that shows associations between working in waste-handling facilities and health problems such as irritation of eyes, throat and skin and respiratory diseases. These symptoms have been related to bioaerosol exposure. High loads of fungi and bacteria are reported in different kinds of waste management plants.

In this study, our aim was to evaluate the helpfulness of the application of molecular methods in the assessment of occupational exposure to fungi of workers in a waste-sorting plant.

Five 300L indoor air samples collected with the Coriolisμ Air Sampler into phosphate-saline buffer were used to isolate DNA, following molecular identification of the pathogenic species *Aspergillus fumigatus*, *A. flavus*, and *Satchybotrys chartarum* by Real-Time PCR using specific primers and Taqman probes. Sampling points were next to the workers operating in different areas of the plant. An outdoor air sample was also collected as reference.

An initial screening was performed using conventional culture methods. Using this methodology, only two genera of common fungi were identified indoors, being the genus *Penicillium* found in all the samples in uncountable colonies and *Rhizopus* in one sample (40 CFU/m3), corresponding to the waste arrival hall. However, by Real-Time PCR, we could identify the presence of *A. fumigatus* and *Satchybotrys chartarum* in the waste arrival hall and *A. fumigatus* in the area of a flat conveyor belt for paper manual picking. *A. flavus* was not detected in any sample.

Our results clearly show the limitations of using only cultural methods to characterize fungal exposition in highly contaminated environments. The overgrowth of predominant species may mask the presence of other potential pathogenic and/ or toxigenic species, which can be revealed by molecular methods.

Preventive measures focused on the protection of the skin and respiratory system, such as appropriate masks and gloves, are highly recommended and should be applied not only to workers that do the manual waste picking, but also to those who perform other tasks inside the plant like tractor drivers, lift operators, supervisors and other technicians.

Whole Body Vibration: Importance of the exposure assessment and communication of preventive measures

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The importance of occupational exposure at whole body vibration (WBV) is increasing due to the predicted health effects that are related to this exposure. The 5th European Working Conditions Survey shows that 33% of men are regularly exposed to vibrations and the European workers remain as exposed to physical hazards as they did 20 years ago (Eurofond, 2010).

Nowadays, the exposure to WBV is widely recognized as associated with musculoskeletal disorders of the spinal system amongst occupational drivers, with the most frequently reported adverse effects being low back pain, early degeneration of the spine and herniated intervertebral discs (Okunribido *et al.*, 2006). However, its harmful effects are not visible immediately but take years of prolonged exposure to be apparent (Vanerkar *et al.*, 2007). Nonetheless, studies have conclusively proved that the adverse effects of WBV exposure are multifactorial and result from the interaction of vibration variables, work attributes, other workplace stressors, physiologic responses and individual attributes (Mayer *et al.*, 2000).

This study consists in an evaluation of the exposure at WBV of workers that perform different tasks with fork-lift truck's, through the comparison between the results obtained and the action and limit values established in portuguese legislation, Decree-Law number 46/2006 of February 24th.

In order to estimated the daily exposure vibration dose value (A8), based on the obtained values of quantify the acceleration equivalent (a_w) in three orthogonal axes x, y and z, the measurements took place between the year 2008 and 2011, in different industries and were made in 16 different fork-lift truck's, with different loads transported and different workers. A portable data logger (Svantek, SVAN958) and a tri-axial seat pad accelerometer (Svantek, SV39A), located at the worker seat, were the instruments used and the measurements were according to the procedures established in Decree-Law number 46/2006 and in ISO 2631-1:2007.

The WBV results obtained ranged between 0,14 and 1,14 m/s^2, with a mean of 0,63 ± 0,32 m/s^2. Comparing the results with the action and limit values established in portuguese legislation, 64% of the results were above the action value (0,5 m/s^2). Nevertheless, none of the results were higher than the limit value (1,15 m/s^2).

Therefore, in order to improve the working conditions and minimize the exposure of workers to WBV, technical prevention and collective protection measures, as well as good work practices, should be considered. The measures should be proposed taking into account each task or

activity that is being evaluated, but among several measures that can be implemented, some are important to all the activities that implies the exposure of a worker to WBV: (1) inform and educate workers to the danger's and risks of exposure to vibrations and related health effects; (2) aware workers to correct work practices, particularly in case of fork-lift truck's, the way they handle load that are transporting and obey velocity limits that are established; (3) ensure effectiveness of the regular maintenance program, namely anti-vibrating existing devices, such as system of shock absorbers associated to fork-lift truck's and their seats.

Exhaled Breath Condensate as a suitable matrix to assess workers exposure to lead

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It is well known that lead adversely affects numerous body systems and causes forms of health impairment and disease that arise after periods of exposure as short as days (acute exposure) or as long as several years (chronic exposure).

The objective of this study was to investigate whether exhaled breath condensate (EBC) can be employed for a better risk assessment among workers exposure to lead (Pb). The EBC, a body fluid commonly used for determination of oxidative biomarkers in airway inflammations, emerges now as an evolving non-invasive tool for evaluation of exposure to polluting metal aerosol. Comparing with other common indicators (like blood), EBC could be advantageously used as a human bioindicator for professional exposure to Pb, once it is non-invasive and quickly and easily collected.

Sixty eight workers exposed to Pb in two different industries and a control group of forty six non-exposed individuals participated in this study. The assessment of Pb exposure was performed in two ways: 1) measuring Pb in the air using direct monitoring; and 2) via biological monitoring by analysing the Pb concentrations in EBC and blood. Suspended particles (PM2.5 and PM2.5-10) were collected with Gent samplers and Pb concentrations were measured by PIXE. Results showed that the workers were exposed to Pb concentrations 10,000 times higher than the controls. EBC was sampled by cooling exhaled air and Pb concentrations were measured by means of ICP-MS. It was observed that Pb concentrations in the exposed groups were significantly enhanced relative to control values.

This fact, together with the correlation between Pb in EBC and in blood, confirms that EBC is a promising biological fluid to be used as reliable marker in occupational exposure that may be helpful in identifying healthy risks of air pollutants.

Biological hazards in dental clinics: Ascertainment of exposure to health workers

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Health workers in dental clinics are exposed to several biologic hazards through contact with body fluids such as blood, saliva or aerosols, so it is important to assess the frequency that accidents occur with these fluids. Both directly and through sharps, the type of exposure, the number of accidents and the affected body parts. The way to avoid infection and illness from these accidents with biological material can be influenced by hand washing and the use of Personal Protective Equipment. The sample consisted on 71 health professionals from dental clinics chosen for convenience and studied by a questionnaire. The study was Level II and descriptive and correlational. It was found that there were more accidents with biological material at the level of the mucous membranes (50%), the more frequent biological materials were blood and aerosols with 30,6%, the most affected body part were the eyes (57,5%) and the most common treatment after the accident was washed with water and saline (50%). It was also found that more accidents occurred in men (56,25%) and the category of highest number of accidents was the dentist (33,8%). We have reached the conclusion that there is still the occurrence of a high number (22,5%) of accidents with biological material in dental clinics.

Occupational Health

Surface contamination by antineoplastic drugs: the importance of studying the work activity using an ergonomic approach in identifying adequate sampling points

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Antineoplastic drugs have a well known potential for causing adverse health effects in occupationally exposed workers, namely in hospital pharmacies responsible for the preparation of chemotherapy admixtures for administration to patients. Described effects include adverse reproductive outcomes and possibly and increased risk of certain cancers. The most significant route of exposure in this setting is considered to be the dermal route, due to skin contact with contaminated work surfaces and equipments. Most studies demonstrate that significant dermal absorption of these drugs still occurs in the majority of the studied workplaces, in spite of the widespread implementation of standardized safe handling practices and use of adequate personal protective equipment.

Our study aimed at studying surface contamination with antineoplastic drugs in hospital pharmacies from three different Portuguese health care institutions.

As a preliminary phase of our study, a detailed analysis of the working activity in the three pharmacy units was conducted by members of our research team specialized in different areas (occupational health; pharmacy, occupational hygiene) using an ergonomic approach. The analysis included a self-assessment questionnaire, interviews and direct observation of the working activity involved in handling antineoplastic drugs in all the circuit from storage to final preparation.

The three pharmacy units studied had different circuits for the circulation of antineoplastic drugs. The handling practices were also different from unit to unit. This resulted in the identification of different sampling points. Some of the sampling points were not considered in the preliminary plan of sample collection and were identified only after thorough direct observation of the work activity.

The identification of adequate sampling points is crucial to a correct evaluation of dermal exposure from contact with contaminated work surfaces and equipments. This must involve an individualized approach for each occupational setting and a careful analysis of specific antineoplastic drug circuits and handling practices.

Key-words: antineoplastic drugs; occupational exposure; surface contamination; work analysis.

Regulations for Hazardous Chemical Substances in Poland in 2011

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In 2011 The Group of Experts for Chemical Agents (GECA), worked in Nofer Institute of Occupational Medicine in Poland proposed health based Maximum Admissible Concentrations values (MAC) for 13 new dangerous chemical agents in the working environment: aniline [62-53-3], acetic anhydride [108-24-7], 3,4-dichloroaniline [95-76-1], octabromodiphenyl ether (technical mixture) [32536-52-0], dibutyl phthalate [84-74-2], hexachlorocyclopentadiene [77-47-4]; silica crystalline – quartz [14808-60-7] and cristobalite [14464-46-1] – respirable fraction, acetic acid [64-19-7], *N*-methylaniline [100-61-8], sodium peroxoborate [11138-47-9], hydrogen peroxide [7722-84-1], styrene [100-42-5], phosphoryl trichloride [10025-87-3]. Health based values, are derived from the most recent scientific data available and taking into account the availability of measurement techniques.

The MAC values in Poland have been set as follows: GECA within the Interdepartmental Commission for Maximum Admissible Concentrations and Intensities for Agents Harmful to Health in the Working Environment performs a critical evaluation of the documentation for the MACs prepared by individual members of the team. The experts prepare health-based documentation for recommended exposure limits along with analytical procedures, recommendations on pre-employment and periodical medical examinations and contraindications to exposure. The experts review all available data and information: experimental animal and human data, structure activity relationship, occupational (human) experience and select most relevant study and dose descriptor. In practice, the scientific data base to set an OEL is not ideal. GECA deals with this by using uncertainty factors. Those proposals are presented during a session of the Commission including representatives of the ministries of health and labor, and representatives of industry and of scientific institutions.

Polish OELs are legally binding administrative norms. To 2011 there are 509 health based MAC values for chemical substances in Poland regulation (Pol. J. of Law No 217/2002, pos. 1833 with amendments).

The specified MAC values constitute the guidelines for the designers of new and updated technologies and products, and the criteria for the evaluation of working conditions.

Effective dose of the patient's companions who underwent therapy with 131I

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The Nuclear Medicine (NM) has the coverage areas of diagnosis and therapy, and in the report of UNESCEAR (2000) it is estimated that worldwide are carried 30 million NM exams and around 400000 procedures of therapy with radiopharmaceuticals, being the most used the Iodine-131 (^{131}I). The Radiological Protection and Safety in NM has a large field of action that goes from patients, general public, family, friends and health professionals. The International Commission on Radiological Protection (ICRP) 94 has not provided a recommendation regarding the procedures at the end of the therapy, in patients who underwent therapy with ^{131}I, however established limits and dose constraints for the public of 1 mSv/year and 5 mSv/episode for the visits and the staff who treat these patients. It appears, however, that the limits referred have interpretation divergences by different countries, so that the hospital discharge criteria depends on: individual basic principles, dose residual from patients, patients desires and expectations, public and occupational exposure, family constraints, costs and environmental aspects. The hospitalization of these patients reduces the public exposure dose, however, often leads to increasing the effective dose in healthcare professionals and results in increased hospital cost, which have to be analyzed and justified. In Portugal, these patients can perform ambulatory therapy, since it satisfies the following conditions: the effective dose, calculated from the dose rate value measured at 1 meter from the "hot" zones, does not exceed the dose limits to members of the public; and ^{131}I therapy in which the activity administered are less than 740 MBq. Patients who do not meet these conditions must perform inpatient therapy until they have a dose rate value measured at 1 meter from the "hot" zones that does not exceed the dose limits to members of the public and then pass to the ambulatory therapy. The thyroid cancer therapy, thyroid metastases and hyperthyroidism, are the procedures which favor the exposure, unjustifiable, to the radioactive iodine from relatives, close friends and other people. For benign thyroid diseases (e.g. hyperthyroidism) the doses range between 200-800 MBq. The recommended doses in thyroid cancer (thyroid ablation) are 1-5.5 GBq and in thyroid metastases from 3.7-7.4 GBq or >7.4 GBq. The doses mentioned above are applied to adults, in the case of children the doses are adjusted according to age.

The aim of this work is to quantify the effective dose of the patient's companions who underwent therapy with ^{131}I, for hyperthyroidism and thyroid ablation.

Development of a cross sectional observational study, in a convenience sample, of 19 patient's companions (12 ♂ and 7 ♀) aged between 17 months and 79 years, which 14 of these

companions of thyroid ablation patients. The method of collecting data uses dose measurements with external TLD dosimeter for 3 weeks.

From the total of 18 patient's companions, 22% (n=4) were children (with 1.5; 5; 10; 13 years old), 61% were man and the average sample age were 38.2 years old. The average absorbed dose in the sample was 0.178 mSv. On patient's companions under therapy to hyperthyroidism and thyroid Abl the average absorbed dose was 0.350 mSv and 0.113 mSv, respectively. The average absorbed dose in the children was 0.097 mSv and on adults is 0.152 mSv.

Patient's companions who underwent therapy for hyperthyroidism, are exposed to an higher dose compared to those performing therapeutic ablation; The absorbed dose of the children was very near to the adults; The absorbed dose in the sample does not exceed the limits set by the ICRP 94.

Sea water near-drowning in THAILAND: electrolytes abnormalities

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Near-drowning patients in sea water are expected to have multiple electrolytes abnormalities. There were limited data about these patients in THAILAND.

To study characteristic of electrolytes abnormalities in sea water near-drowning patients in Burapha University Hospital THAILAND.

Retrospective analytic study of 39 medical records of near-drowning patients admitted to Burapha University Hospital during 2000-2010.

There were 23 male, 16 female patients. Average age was 14.46+11.15 years, 19/39 (48.72%) patients were aged 8 or less. The following electrolytes abnormalities were identified; hyponatremia 2/39 (5.1%), hypernatremia 12/39 (30.8%) hypokalemia 8/39 (20.5%) hyperchloremia 16/39 (41.1%) high anion gap 23/39 (59%). Seven out of 8 patients in hypokalemia group were in the high anion gap group. Mean SpO2 in the patients who had high anion gap was significantly lower than normal anion gap group (87.06+17.68% vs. 95.8+5.94% p=0.031) without difference in systolic blood pressure (112.59+14.63 vs. 105.67+13.98 p=0.159)

Hypernatremia, hypokalemia, hyperchloremia and high anion gap were common in sea water near-drowning patients in THAILAND. The cause of high anion gap was probably due to hypoxia.

Public Health

The elusive nature of indigenous people's rights under international environmental law

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To explore the way that international law can unintentionally work against the guaranteeing of the rights of indigenous people the paper provides an initial assessment of the way that the Convention on Biological Diversity (CBD) and ILO principles concerning occupational health and safety (OHS) combine to produce unwelcome and unintended consequences. The analysis seeks to show why contemporary international environmental law relegates the rights of indigenous people, and in doing so looks at how the CBD created internationally accepted rules for resource exploitation, and which, although it envisaged possible threats and human rights violations for indigenous peoples, nevertheless failed to secure measures for protecting indigenous peoples from potential violations. In light of this, the paper reviews the commitments by actors, towards indigenous people; within the auspices of CBD, and *contextually* ILO treaties that deal with OHS, to assess whether the systems for ensuring that the ideals of the CBD 'trickle down' to operate effectively and equitably. By providing an initial assessment of this process the analysis starts to provide a framework for answering whether such regimes actually solve the environmental challenges facing indigenous people, and whether they promote environmental justice at the grassroots level. Questions for further analysis are identified, and the need for a more substantial piece of research to answer the questions posed, is proposed.

Public Health

Health and economic inequalities in childhood morbidity from diarrhea

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This study aimed to investigate the association between the type of final disposal of solid waste and per capita income with the number of hospitalizations for diarrhea in children under five years in the Southeastern of Brazil.

It is characterized as an epidemiological and ecological study, based on the reality of the State of Minas Gerais, which is the third largest Gross Domestic Product-GDP in Brazil.

Data on the final disposal of solid waste were obtained from the last report by the State Environmental Foundation of Minas Gerais, in 2010. The municipalities were grouped according to the final disposition of solid waste they had, i.e.: waste disposal, landfill and garbage dump.

Data regarding the number of hospitalizations for diarrhea in children under five years, in 2010, were obtained from the Hospital Information System of the Unified Health System in the country.

The statistical analysis was performed using the SigmaStat software version 3.5. ANOVA were calculated to determine differences between the types of final disposal of solid waste and per capita income with the number of hospitalizations for diarrhea. When the level of significance of the analysis was reached ($p<0.05$), it was applied the Tukey´s Multiple Comparison Test; and it was also calculated the Pearson correlation coefficient.

In this study the option was to analyze the economic profile of the region of *Vale do Jequitinhonha* and the region of Minas Gerais Triangle, which have per capita income of approximately U.S. $ 2,500.00 and U.S. $ 12,200.00 respectively.

During the study period, there were 2,298 hospitalizations for diarrhea in State. The incidence of diarrhea in municipalities with garbage dump was of 12.57 cases per 1000 children under five years, and 2.37 times greater than the incidence of diarrhea in the population of the same age living in cities with landfill.

Through the statistical analysis was possible to establish a moderate correlation between the hospitalizations for diarrhea and the number of children under five living in municipalities with garbage dump ($r = 0.758$, $p = 0.018$).

Public Health

The study revealed that the incidence of diarrhea in children under five years in municipalities with garbage dump in the region of *Vale do Jequitinhonha* was 9.36 cases per 1,000 children, and 6.33 cases of diarrhea in children of the same age per 1,000 children have been registered in municipalities with garbage dump in the region of Minas Gerais Triangle.

Statistical analysis shows a significant difference ($p<0.05$) between the number of hospitalizations for diarrhea in children under five years in regions with high income per capita (Minas Gerais Triangle) and the number of hospitalizations for diarrhea in children living in regions with low income per capita (*Vale do Juquitinhonha*).

The results suggest that to reduce morbidity due to diarrhea in children under five years, it should be considered the potential of health intervention on the health risks. The existence of garbage dump associated with low per capita income are indicative of the need for investment in the areas of infrastructure for that the disease control can be done preventively.

Drinking Water and Cancer: the Exposure Assessment Challenge

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Concerns have been raised for years on the potential carcinogenic effect of low-level chemical contaminants present in tap water. Despite many epidemiologic studies on that topic, very few have produced results that could be helpful for risk assessment.

To discuss the different components of the exposure assessment to chemicals present in water and how they could be improved for further epidemiologic research.

Evaluation of the contamination of water at the tap needs usually complementary sampling to the regulatory monitoring data.

Personal exposure assessment needs information on consumption of tap water but also on home treatment and other handlings used before consumption. Shower and bathing frequency should be recorded when inhalation and dermal absorption are concerned. Combining the different routes of exposure is essential to derive a measure of the total internal dose at least for home exposure.

When possible, valid biomarkers should be used but few are presently available. The new exposome paradigm should help to evaluate more globally the impact of the mixture of chemicals present in drinking water.

Given the necessity, for cancer research, to collect information during a long period of time, the exposure to waterborne chemicals could be done in depth mainly in prospective studies. There is also a need for coordination of ongoing research on drinking water and cancer.

Public Health

Basic "good housekeeping" in a rural settlement can eliminate the exposure to mosquito borne infections

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Mosquito borne infections have hounded the human species for centuries, and still represents one of the most important infectious disease threats. The life cycle of the mosquito necessitates a blood meal to produce eggs. As with the *Anopheles* mosquito, *Culex* and *Aedes* mosquito prefer to feed on humans. This study proved that by basic elimination of stagnant water in a rural settlement, mosquito borne infections can potentially be reduced by half.

During a study conducted from August 2009 to May 2011, on a farm in the Free State, South Africa, the behaviour of *Aedes* and *Culex* mosquitoes were monitored. This farm was chosen due to its low annual rainfall, isolated setting and inhabitants of 10 adults and 15 children. 5 Houses were in a radius of 30 meters. This simulates the layout of a rural settlement.
Water containers were placed in a radius of 10m, 50m, 100m and 500m around the residing dwellings. Other permanent sources, 800 m and further, were part of the study to determine the larvae load. The same methodology was applied during all 6 monitoring cycles. The larvae load in 22 radiates water sources were determined to a distance of 3 km away from the host site. Bellamy and Reeves mosquito traps were use to establish the mosquito population before and after the removal of stagnant water.

Public Health

Water containers up to 500m away from the hosts had a similar larvae load. In containers 800m and further, larvae load were on average 45% less. By eliminating the larvae in containers up to 100 meters away from the dwellings, the mosquito population decreased by *circa* 55%. With Bellamy and Reeves mosquito traps, less than 42 % mosquitoes were caught.

Vast amounts of energy and money are spent on pesticides. This study results proved that basis stagnant water control can eliminate mosquito exposure by 47.5%.

Parasitological control of animals kept in a Zoo and Public Health - environmental contamination by feces with zoonotic parasites forms in a portuguese Zoo

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Zoo animals living under captivity are exposed and vulnerable to all kind of infectious diseases, as the parasitic ones. This may be a major problem in a zoo, especially if the diseases are zoonotic, not only because of the zookeepers as for the visitors. Maia Zoo (Portugal) was created in 1985, and has close to 300 different animals: 123 birds, 86 mammals, 84 reptiles and 7 amphibious. The aim of this study was to identify the risk of human infection with parasitic forms from the animals housed at this zoo. For this purpose, with collected indirectly 46 fresh faeces samples and parasitologic investigation was performed by applying Willis Method, a qualitative fecal examination technique. Concerning to felines (*Prionailurus bengalensis, Panthera leo, Panthera onça, Lynx lynx* and *Panthera pardus*), we collect first 10 samples, 7 of them had *Toxascaris leonina* eggs. These animals were treated with Ivermectin, and then another 5 samples were collected and no parasites were found. We also collected 13 samples from primates (*Eulemur fulvus, Varecia variegate, Callithrix jacchus* and *Mandrillus sphinx*) and we found 1 sample with a non zoonotic coccidian. As for the parrots (*Psittacus erithacus*) we had 9 samples and we found in 2 coccidia and strongyle eggs, also non zoonotic. From Equine (*Equus quagga* e *Equus caballos*) we collected 7 samples, and 2 had non zoonotic coccidia. Finally we analysed 1 sample from *Hystrix africaustralis,* and another from *Procyon lotor*, no parasites were found. Animals that were infected were all asymptomatic. *Toxascaris leonina* is commom in felines kept in zoos, as we confirmed. *Toxascaris leonina* may affect humans, considering that most of the visitors are children and therefore a risk group, all the care is needed. Routine monitoring of the presence of parasites in animals kept in the zoo is imperative in assisting zoo management in the formulation and implementation of preventive and control measures against the spread of infectious parasitic diseases among animals within the zoo and especially to humans - zookeepers and visitors.

Public Health

Lifestyles and Potential Risk for Diabetes in Public School Students from ABC region, São Paulo, Brazil.

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Until the first half of the twentieth century, there was a predominance of infectious diseases such as cholera, malaria, and even some chronic conditions such as scurvy and pellagra, which were both macro-environmental precautions and depended on the collective level. With the modern lifestyle, the stress ofeveryday life, and also with the improvement of sanitation conditions, these conditions gave rise to chronic degenerative diseases, the major cause of death in Brazil, such as hypertension and diabetes that are likely micro-environment where the focus ison the individual and their lifestyle. The study on risk factors forthese diseases has promoted closer to clinical epidemiology.The Diabetes mellitus is a chronic-degenerative illness that express the consequences of the modern life. The increase of the overweight taxes and obesity associates to the alterations of the life style and the population aging are the main factors that explain the growth of the prevalence of diabetes. It has evidences of the increase of this pathology in children and adolescents and, therefore problem of public health. The objective was to identify harnesses factors of risk for diabetes type II, knowing the alimentary habits of life and of the adolescents of the average education of the public net of the Region of the Great ABC, São Paulo.

The research was based on the data-collecting through a questionnaire and IMC. Around 900 students were interviewed and we verified: 27.5% had a breakfast in the morning, 65% do not consume fruits and vegetables, 23% ate at the fast food, 31% drank alcoholic beverage, 48.5% had diabetics cases in the family, 36.5% had obesity in the family. In the other hand, 59% performed physical activities and 75% watched TV and use the computer. Added, the study revealed in Santo André 56% have relatives with diabetes. Sao Bernardo do Campo has the highest rate of students who have cases of obesity in the family (42%). Ribeirão Pires has the highest rate of students who drink and candy (42%).

It is necessary to promote educative campaigns in the schools related to the healthful habits of life in order to prevent problems to the health and to promote well-being. In the other hands, we must associate the school curriculum with a healthy lifestyle in order to prevent health problems, reduce the number of hospitalizations and promote well-being.

Keywords: Diabetes Mellitus, Adolescents, Schools.

Public Health

Occurrence of *Cryptosporidium* wastewater treatment plant in Northern Germany

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Cryptosporidium purvum, is one of the most common human parasitic protozoa that have caused many waterborne outbreaks in several industrialised countries. The oocyst which is the infective form are known to be highly resistant to wastewater treatment procedures and represent a potential hazard to human populations through contaminated raw or treated waste water. In this investigation the occurrence of *Cryptosporidium* in wastewater samples was monitored and the removal efficiency assessed. Treated (effluent) and untreated (influent) wastewater samples were collected three times monthly in the four seasons of the year: summer, autumn and winter of 2009; spring, summer, autumn and winter of 2011. The presence of *Cryptosporidium* oocysts was determined using immunomagnetic separation and immunofluorescence with monoclonal antibodies in accordance with the modified US EPA 1623 method. The oocysts were repeatedly detected in influent and effluent samples collected from the treatment plant during all sampling seasons with a mean concentration 782 oocyst per litre. The seasonal distribution showed that oocysts are predominant during autumn and winter. Genus-specific anaylses by means of PCR and sequencing revealed that *Cryptosporidium parvum* human and bovine genotype was the dominant *Cryptosporidium* parasites in Hamburg wastewater. The result suggests that the risk of the pathogen entering and polluting surface water is high.

Public Health

Seasonal changes of blood lead levels in young children: A literature review

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Several studies have reported a high proportion of lead-poisoning in children during the warmer months. However, its importance and the mechanism underlying this relationship remain unclear. The aims of the present review are to estimate the size of seasonal changes of blood lead levels (BLL) in 1-5 years-old children, and to identify the factors that may explain those changes.

Search strategies were developed in MEDLINE, EMBASE, ISI Web of Science, and CINHAL, with no restriction about year of publication. Studies included were those published in peer-review journal, in French or English, with BLL as response variable, and including children between 1 and 5 years of age. Each included study was assessed for methodological quality according to four criteria: 1) study design, 2) definition of season, 3) method of blood collection, and 4) participants selection. When possible, a maximum-to-minimum ratio (MMR) was calculated, which is the ratio of higher and lower mean BLL values reported in the study. Studies reporting results from multiple regression analysis were reviewed to identify factors influencing the relationship between seasons and mean BLL.

A total of 4040 published papers were identified. Only 26 cross-sectional and 8 cohort studies were relevant of inclusion criteria. MMR varied from 0.79 to 3.57 in cohort studies and from 1.10 to 1.48 in studies with cross-sectional design. Seven cohort studies and 23 studies with cross-sectional design reported a significant increase of children's mean BLL during warm months. Only one cohort study reported a decrease of mean BLL during summer, and this effect was observed in children with very high baseline value of BLL. The magnitude of mean BLL summer increase was more important in 1-3 years old children, and especially in those living in urban and rural area, when compared to those living in suburban area. The summer increase of mean BLL in children aged under 3 was independent of serum 25-hydroxyvitamin D level. The baseline value of mean BLL is inversely correlated with the magnitude of the seasonal changes across cohort studies. Multivariate analysis from cohort studies showed that seasonal effect was no more significant after adjusting for environmental lead (e.g. floor dust lead loading, windowsill lead loading, carpet lead concentration, indoor air-lead concentration). The impact of lead-contaminated water was not taken into account in any of the included studies.

Public Health

The mean BLL increases during warm months, and the effect is more important in 1-3 years old children. The sustained increase of lead-contaminated dust would be the main intermediate variable in the relationship between seasons and mean BLL among 1-3 years old children. Further studies are needed to determine the contribution of lead-contaminated water.

Cyanobacteria Toxicity: Public Health Impact in South Portugal Populations

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As a life fundamental natural resource, water and aquatic ecosystems must be continuously evaluated in their physical, chemical and biological quality. According World Health Organization, 1.1 billion people has no chance to access any kind of potable water. Populations living near rivers, lagoons or reservoirs use those waters to content their needs, increasing risks disease transmission. As members of phytoplankton community, cyanobacteria are prokaryotic, photosynthetic microorganisms and get its nutrients directly from water column. The increase of this nutrients (especially nitrogen and phosphorus) associated with favorable environment conditions, can support a sudden grow and instigate blooms. Under specific conditions cyanobacteria can produce toxins and several records have shown that toxic blooms are responsible by acute poisoning and death in animals and humans so, water for human consumption must be regularly surveyed for this biologic element. The aim of this study is to correlate cyanobacteria blooms (>2.000cels/ml) and connected toxicity with public health impact, evaluated through water consumption.

Eight Portuguese reservoirs located in the South region were selected and characterized in physical and chemical aspects, as well as phytoplankton community, between 2000 and 2008.

During study period, liver toxins and neurotoxins producers *like Aphanizomenon sp*, *Microcystis aeruginosa* and *Oscillatoria sp*. were founded in bloom circumstances.

This genera presence represents a potential risk for public health, and show the requirement to implement mitigation measures in all study reservoirs. These measures can be represented by water eutrophication control to avoid blooms, by appropriate treatments of water to human consumption, and public warnings or information to those people in Portugal that use these reservoirs to several activities.

Public Health

Knowledge of public health patients waiting for care in the Specialties Ambulatories (FMABC), about the management of waste generated in their homes.

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The National Health System (SUS) was created by the Brazilian Federal Constitution in 1988 so that all people have access to public health, follows the principles of universality, comprehensiveness, equity, decentralization, regionalization and hierarchization; principle of hierarchy in the Specialties Ambulatories of the Faculdade de Medicina do ABC, is the secondary sector or medium complexity and provides services to the entire population of the Greater ABC (comprised of seven cities) and the city of Sao Paulo. The solid waste management is a subject extensively discussed in these regions, due to increased public concern and the authorities with the separation and proper disposal of waste generated in homes and industries.

To assess the level of patients' knowledge of the SUS (Unified Health System), which await the outpatient clinic of specialties from the ambulatory about the separation and proper disposal of waste generated in their homes.

Public Health

Patients and Methods: We surveyed 100 SUS patients of both sexes and aged between 20 and 75 years, waiting for the outpatient clinic of specialties, which were chosen randomly. For data collection a questionnaire was administered orally during the wait interval between patient arrival at the clinic and medical care, which addressed issues such as gender, age, income, knowledge about recycling center, often in separating household waste, among other issues. From the data obtained, we achieve qualitative results that were submitted to SPSS 17.0 for statistical analysis.

The results obtained through the statistical analysis showed that the habit of separating materials becomes more common among people with higher income (qui² $p = 0.024$) and understanding the meaning of the acronym 3R is more common among people with higher income (qui² $p < 0.001$) and with higher educational level (qui² $p < 0.001$). Another result with statistical significance is that the degree of satisfaction with the management of waste decreases with increasing educational level (qui² $p = 0.009$).

The results indicate a higher level of knowledge and action among people of higher income and higher educational level among the patients surveyed, suggesting that this period that the patient is idle can be used for guidance, answering questions and raising awareness of the expectation resulting in actions between patients on the subject and about environmental problem.

Risk of developing Diabetes in 10 years of primary health care professionals in Amadora

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Diabetes is a major public health problem, despite all efforts, the number of diabetic patients is still rising. In Portugal, the last prevalence population based study (PREVADIAB) estimated a prevalence of 23.3% people with pre-diabetes (impaired fasting glucose, impaired glucose tolerance or both). When planning specific interventions, it is of the utmost importance to look specific groups of the population. Health professionals in primary care are a group not studied often and more evidence is needed, the aim of this study is to fill that gap.

The objective of this study is to evaluate the 10 year risk of developing Diabetes type 2 in health and health-associated professionals, in the primary care facilities in Amadora.

The study was performed in the public primary care facilities in Amadora. During August of 2011, the fifteen facilities were visited and we included all the professionals that accepted to participate in the study. All previously diagnosed diabetics were excluded. To determine the risk of developing Diabetes, we used the FINRISK questionnaire, translated to Portuguese, taken from the Portuguese National Plan to Control and Prevent the Diabetes and we included an extra question about the self-reported Health status, evaluated by a Likert scale from 1 to 5. The chi-square test was performed to test differences in risk of developing diabetes between the male and female groups. Values of $p<0.05$ were considered significant.

We screened and included in the study 147 (48%) professionals out of a total of 309, 32% of which were assistants, 27% nurses, 31% doctors, and the remaining 10% were psychologists, social assistants and other technicians, 81.3% of the professionals were women. Seven professionals were diabetic, and thus were excluded.

Table 1 shows that the mean of BMI is above 25 Kg/m^2, already in overweight, and 50.7 % is obese or pre-obese.

Nobody scored in their self-reported health as very bad, and in 68.7% was good or very good. Only 26.5% exercised every day and 70.7% ate vegetables every day. 17.7% professionals took antihipertension medication on a regular basis. The results showed us that among health and health-associated professionals 65.5% had a low or slightly elevated risk of developing Diabetes in the next 10 years but 13.6% have a high or a very high risk. No statistical differences were found between the risk of developing diabetes between men and women.

Variable	Men		Women		Total	
	Nº	Mean (SD) or %	Nº	Mean (SD) or %	Nº	Mean (SD) or %
Age (years)	27	45.5(12.6)	120	45.2(10.3)	147	45.3 (10,7)
BMI	27	26.8(4.1)	120	25.5(4.6)	147	25.7 (4,5)
Low weight	0	0%	3	2.5%	3	2.1%
Normal	9	33.3%	60	50.4%	69	47.3%
Pre-obesity	12	44.4%	39	32.8%	51	34.9%
Obesity	6	22.2%	17	14.3%	23	15,8%
Waist	27	94.8(12.4)	120	83.6(10.7)		
At risk (men >102cm, women >88 cm)	8	29.6%	48	40%	56	38.1%
Self-reported health						
Bad	1	3.7%	3	2.5%	4	2,7%
Regular	5	18.5%	37	30.8%	42	28,6%
Good	18	66.7%	66	55.0%	84	57,1%
Very good	3	11.1%	14	11.7%	17	11,6%
Do exercise 30 min/day	10	37%	29	24.2%	39	26,5%
Eat vegetables or fruits every day	22	81.5%	81	68.1%	103	70,5%
Take medication to Hypertension	7	25.9%	19	15.8%	26	17,7%
Had hyperglycemia or diabetes during pregnancy	2	7.4%	9	7.5%	11	7,5%
Family with Diabetes						
Don´t have	14	51.9%	56	46.7%	70	47,6%
Grandparents, uncles or cousins	5	18.5%	29	24.2%	34	23,1%
Parents, brothers or children	8	29.6%	35	29.2%	43	29,3%

Score						
Low or slightly elevated	18	66.7%	78	65%	96	65,5%
Moderate	4	14.8%	27	22.5%	31	21,1%
High or very high	5	18.5%	15	12.5%	20	13,6%

We may say that the BMI evaluation was similar to those found in the last population based study (SPEO 2008). The prevalence of obesity and pre-obesity in the previous study was 53.2% against 50.7% found in this study. It was expected that this group would perform better. Although 68.7% consider their health good or very good, only 26.5% exercise on a regular basis.

This study was very helpful in identifying the risk of developing Diabetes in a 10 year period (13.6% have high or very high risk) in a specific population. It also brings some evidence about this often overlooked group.

School textbooks as expressing national education policies on environmental education: a comparative analysis among 14 countries

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It has been recognized that Environmental Education (EE) is a relevant process to make students aware of local and global environment and their associated problems. EE not only improves students' knowledge but also contribute to develop their attitudes and skills to work individually and collectively towards solutions of current problems and the prevention of new ones. School textbooks translate national programmes guidelines which are the expression of national education policies and participate in the cognitive and social organization of knowledge. They are used by teachers with a double function: as a national programme (or syllabuses) guideline and as a pedagogical resource. Thus, the textbook analysis turns out to be a relevant tool for studying socio-cultural determinants of environmental problems. Textbook analysis is seen as a major element for studying environmental education addressed to pupils, being image analysis rather relevant when studying textbooks written in different languages.

The present study was developed within the large European project BIOHEAD-CITIZEN (FP6, STREP CIT2-CT-2004-506015) involving 19 countries and 11 languages. In the present study, 25 textbooks from 14 countries were analysed: Western European countries (WEc) – Finland-2, France-2, Germany-2, Italy-4, Malta-1 and Portugal-1; Eastern European countries (EEc) – Cyprus-1, Estonia-1, Hungary-2, Lithuania-1 and Romania-1; and Non-European countries (NEc) Lebanon-3, Morocco-2 and Senegal-2. Textbooks were addressed to 14-16 years-old students, focusing on: (i) urban/rural and nature images; (ii) local and foreign/global images; (iii) men and women in images with negative and positive impact; and (iv) negative impact, human management and the beauty of nature.

Some trends between Western (WEc) and Eastern (EEc) European countries and non-European countries (NEc) were found. In contrast to the EEc and NEc textbooks, which tend to show the beauty of nature with little humans' influence, WEc textbooks tend to exhibit more images of urban/rural landscape, of human negative impact and of human management, expressing an anthropocentric view about the environment. Usually, men are more present than women in textbook images. Only scarce images exhibiting more women than men; they were found in WEc and EEc textbooks only, never in NEc. Men, more often than women, are exhibited in negative impact pictures, and NEc women are never present in such images. In contrast, in positive impact images, women are more frequent than men.

Public Health

Recommendations to authors and publishers should be addressed: EEc and NEc textbooks to highlight human management and urban/rural images; EEc textbooks to give more attention to the beauty of nature; in general, a better balance between men and women presence in images should be taken into account; finally, local and foreign images should be exhibited in a better balance so that students can get access to a wider reaching view of the geo-socio-cultural diversity of the world and their environmental problems.

Evaluation of knowledge, attitude and practice related to standard precautions of physicians and surgeons in a healthcare unit

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Prevention and control of hospital infection depends, for the most part, on adhesion of health professionals to the use of preventive measures. This study aims to assess knowledge, attitudes and good practices of physicians and surgeons in a health unit, compared to Standard Precautions (SP).

To accomplish this objective, a level II study was applied which incorporated a survey of a transversal nature, in a health unit from Oliveira do Hospital, Coimbra district, using a target population of all physicians and surgeons of the health unit's medical staff. The sample was of non-probability type and used a convenience technique. Data collection took place during August and September 2011, through survey delivery to the above mentioned professionals.

This study showed that the levels of knowledge and attitude of health professionals towards Standard Precautions were positive. However they still have several things to improve. With concern to good practices, results obtained were lower, demonstrating that it is the compliance of professionals to Standard Precautions that reside the greatest difficulties. The investment in training and information for professionals, motivation programs to combat the lack of importance given to the said training and the organization of a week of awareness and training for the control and prevention of infection, with the auditors appointed by the Hospital Infection Control Committee, are some of the measures proposed to address the gaps identified in this study.

Public Health

Health and environmental education: the way that Portuguese textbooks tend to resolve the pollution problems

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Environmental education is an issue of unquestionable social importance as it is imbued with values that transcend the mere respect for the environment and environmental health. It crosses citizenship, health promotion and respect for others and it is a discipline providing guidance on how to deal with the continuous changing world. Textbook analysis is a matter of current research as they reflect the national socio-political context and curriculum guidelines. This content analysis is known as the External Didactic Transposition (EDT) which is a process for analysing why, and how, certain scientific contents are taught, or not. When the issues are in the national school curriculum (and subsequently in textbooks), the internal didactic transposition focus on how they are taught in the classroom. Therefore, textbooks, which usually follow the guidelines of the school curriculum, are important elements for the analysis of socio-political context, particularly in the environmental health issue.

This study was developed within the European project FP6 STREP "BIOHEAD-CITIZEN" (CIT2-CT2004-506 015), entitled "Biology, Health and Environmental Education for better Citizenship", with particular focus on the analysis of textbooks. The purpose of the present work was to analyse the didactic transposition of Environmental Education, specifically the topic *Pollution* in the educational system of Portugal. Ten textbooks from the 1st to the 12th grade were analysed by using a part of the grid of analysis built in the BIOHEAD-CITIZEN project, giving particular emphasis to the analysis of *approaches to solving problems related to pollution* and its impact on citizens' health and *strategies to prevent pollution*.

The results showed that technological solutions are most often mentioned in textbooks (mean of 7.5 occurrences per textbook) instead of changes in the individual (1.5 per textbook) or social (1.8 per textbook) behaviour. In respect to the strategies to prevent the pollution, the educational and ecological strategies are the most referred in the Portuguese textbooks. The results obtained in this study, lead us to make some recommendations such as to give greater emphasis to the role of humans attitudes and behaviours in preventing and/or solving pollution problems – more than only technological tools that are not in students' hands – and thus, to contribute to promote students' citizenship and to improve environmental health as well as the quality of life.

Public Health

Since textbooks are the main pedagogical tool used in the Portuguese teaching and learning process, they can be good resources for improving students' attitudes and behaviours towards their local environment as well as their awareness of the larger, global environmental health issues.

Health services' waste management politcs at a veterinary hospital at federal university of Pelotas/Brazil – health and environment

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The resultant wastes of different activities which exist at Higher Education Institutions – IES, when managed inappropriately, cause risks to the occupational health and environment degradation.

Therefore, becomes necessary and urgent the construction of integrated wastes management politics at these circuits, which request the linkage of an educative process in an environmental health perspective, so that potentiates the involvement and participation from university community in the sustainability construction.

With the aim of building wastes management politics at a High Superior Federal Institution – IFES, from its implementation at Veterinary Hospital – HV in an environmental health perspective, it was realized a study from qualitative nature. From the thematic analysis of the collected data from focal group reunions – Trigger group, comprising 28 subjects from different sectors of the Institution and Construction Group, comprising 36 subjects from HV; from the documental analysis about the Constitution, Regiment, Lobby and the Institution Mission and the institutional environment observation, emerged two categories: a) The apparent invisibility of the construction process of waste management politics at the High Superior Institution – Focusing the need to know the total and the piece: The environment and institutional structure context; The waste generation and his management situation at the Institution; The reality of an Institution campus regarding wastes handling; the health services wastes management process; experience at the Institution and others, relative to health services wastes management programs; and b) The visibility in the politics construction process for a wastes management at an Higher Education Institution – focusing in the politics construction process, the health services wastes management plans in the piece – HV, but in interrelated way with all, comprising the Identification of wastes problematic; the planning and implantation of goals and actions; and the Continuing Education Program.

The data allow declaring that, the wastes management politics construction at IFES, through educational use in an environmental education perspective and a complex thought dimension, potentiates the university community for a thought reconstruction, enabling to think the institutional reality as a complex all/piece/all system integrated and articulated, contributing to an ethical behave, responsible and committed to the involved health care and with the environmental sustainability.

Public Health

International course for the waste management of health services at a border area

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The need to approach the problems related to health and environment in an articulated and interconnected way are aspects which should be redeeming in a wide approach, at publics politic circuit for environmental health. Herewith, health and environmental questions demand an approach consistent with the environmental and social diversity which interferes, dynamically, in the understanding as adjusted answers to the countless demographical, social, cultural, political, economic, legal and environmental realities existents on these territories.

The Brazil' borders questions analysis, related to the elaboration of public politics associated to progress, sustainability and better living condition concepts only awaked the interest of studious and researchers more recently. Therefore, these politics approach at the Brazil-Uruguay boarder in twin cities as Santana do Livramento and Rivera becomes a real challenge in view of the territory complexity, which local actions sometimes intermingles, sometimes conflicts with global actions.

Public Health

Accordingly, the Federal University of Pelotas (Pelotas – Brazil) promoted at the Boarder Studies Center (Santana do Livramento – Brazil), the international course for the waste management of health services with a 100 hours' workload, aiming the dialog approximation of these two territories, for the construction of united actions for the right management of this wastes. In the schedule it was accomplished the study of politics and legal bases for the waste management in the health area at Brazil/Uruguay boarder; the environment study and the relations in the boarder; the waste management in health services and their management stages – generation, minimization, reutilization, recycling, segregation, identification, packaging, gathering, storage, transportation, handling and final destination; the construction of waste management plans in the health area – team building, diagnostic, action planning, implantation, monitoring and evaluation.

The course participants was twenty professionals which works in the health area – nurses, safety work engineers, physiotherapists, radiologists, nursing technicians, biochemists, pharmacists, chemical engineers, among others – belonging to neighboring towns, being ten members of Santana do Livramento, Brazil, and ten members of Rivera, Uruguay. This approximation supported the articulated politics integration between the two boarder cities for the waste management of health services, contributing for both the prolonged formation of professionals, as to the desired environment quality and sustainability.

Self-efficacy dimensions as correlate of knowledge on dengue and dengue preventive behaviors among community exposed to health promotion and educational intervention during outbreaks

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The purpose of health promotion and educational intervention during dengue outbreak is to increase awareness and promote preventive behaviors change to control the outbreak and prevent further disease transmission. This study aims to examine the level of knowledge and dimensions of self-efficacy in determining their relationship with dengue preventive behaviors as a way to effectively control of dengue outbreak. Participants were 280 adults recruited from 27 post-outbreak villages in state of Terengganu, east coast of Malaysia. Measures of health promotion intervention activities and types of communication during outbreak, level of dengue knowledge, level and strength of self-efficacy and dengue preventive behaviors were obtained via interviews and administered questionnaires. *Gotong-royong* (community cleanliness program), public lectures and individual advice are educational activities that significantly increase the level of knowledge ($p<0.05$). Most villagers (79.3%) had considerably good knowledge on dengue, however their level and strength of self-efficacy were relatively at low or poor (>79%). Level of knowledge ($p=0.001$) and strength of self-efficacy ($p=0.011$) were significantly correlated with dengue preventive behaviors. There was significant and positive linear relationship ($r=0.288$) between proportions of villagers who didn't observe 10-minutes-cleanliness behavior with prolonged outbreak days ($p=0.044$). Therefore, to effectively control dengue fever transmission and outbreak, health promotion and educational intervention must always focus on increasing level and strength of self-efficacy as to mediate existing knowledge on dengue with the intended preventive dengue behaviors.

Public Health

Energy Audit of a Health Unit Case Study Portuguese Center Region

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In a changing world, the use of energy in a rational way is the effective solution to improve the institution's competitiveness in the market, with the certainty that only the avoided consumption will not increase its cost in the future. In this sense, it is urgent to promote measures and actions that contribute to a more rational and efficient use of energy, it aroused us special interest, constituting our research problem. This study aims to define and design an energy management system appropriate to the institution and evaluate objectively the results obtained with the implementation of the energy management system, making known the results with the goal of raising awareness and adoption of behaviours to the importance of the rationalization of energy of the institution. To complement this study, it was established a relationship between electricity consumption and CO2 emissions associated with said consumption, as well as the trees that would be needed to plant in order to suppress these emissions. Energy management cannot be seen purely as a legal requirement, but as a factor with the importance and accuracy as are managed human resources, financial and other. The study was classified as level II, descriptive-correlational and of transversal nature. To carry out this study, we proceeded to collect of existing information and conducting field work in the institution. The sample was composed of two floors and the type of equipment that form the unit, with a total of 77 rooms. The collected data was then processed using the statistical software SPSS version 17.0. The interpretation of the statistical tests was based on the level of significance of α=0,05, with a confidence interval of 95%. The obtained results indicate the existence of inefficient lighting systems from the standpoint of energy, economic and environmental. We conclude that there are changes that could be implemented at the level of the health unit.

Public Health

Keywords: energy, energy efficiency, energy management, energy audit.

Risk perception and behaviour against medication out of use and packaging waste – case study: city of Torres Vedras

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The goals of this research are to find what Portuguese families know and do to their medication out of use and their packaging and also evaluate the performance of delivery of such waste in pharmacies, based on certain variables.

To achieve these objectives, it was selected the town of Torres Vedras as a case study and was used as an analytical tool, a questionnaire designed to be taught face-to-face users of existing pharmacies. The questionnaire was administered to a sample of 89 clients, according to predefined sampling methodology.

The results showed that most people lose the only drugs left over when it ends its period of validity, giving them as a destination, the pharmacy first and then the bin.

The main destination of primary packaging is the dustbin and the secondary packaging is the collection points. It is mainly women who go to the pharmacy to deliver medications out of use, are aged between 35 and 54 years, and have the 10th/11th/12th of the former unified or 7th year of high school altogether.

The main reasons that lead people to deliver the drugs at the pharmacy are other reasons and health / environment.

It was still possible to see that there are differences between the group that fails to deliver medicines in pharmacies and group delivery, particularly in the variables of perceived risk, information and knowledge about the fate Valormed and more accurate for medicines out of use.

These results provide an important contribution to the communication strategies and actions to improve the rates of recovery and recycling of waste. The findings from this study are intended to serve as a basis for future more comprehensive investigations, enabling future strategies in the management of drug residues.

Public Health

Identification of micronucleus in buccal mucosa cells. What is the best staining?

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Micronuclei (MN) are classified as biomarkers of the breakage and loss of chromosomes and are widely used as biomarkers of cancer risk in humans. The Buccal Micronucleus Cytome assay is a new minimally invasive system for studying DNA damage, chromosomal instability, cell death, and the regenerative potential of buccal mucosal tissue. This method is increasingly being used in molecular epidemiologic studies investigating the impact of nutrition, life-style factors, genotoxin exposure, and genotype on DNA damage and cell death. Nowadays, buccal mucosa cells have been used in biomonitoring exposed populations because these cells are in the direct route of exposure to ingested pollutants, are capable of metabolizing proximate carcinogens to reactive chemicals, and are easily and rapidly collected by brushing the buccal mucosa. The aim of this study consists in the comparison of seven techniques for staning for buccal mucosal cells in order to detect appropriately micronuclei. These techniques are: Papanicolaou (PAP), Modified Papanicolaou, May-Grünwald Giemsa (MGG), Giemsa, Harris's Hematoxylin, Feulgen with Fast Green counterstain and Feulgen without counterstain.

Public Health

Seventy cytology smears (two per individual) were taken from the buccal mucosa by scraping with endobrush. Ten smears were stained with each technique. The slides were evaluated under a light microscope with 1,000-fold magnification using immersion oil according to the parameters of nuclear, micronuclear, citoplasmatic staining intensity and staining artefacts. The criterion of the chosen staining techniques was the specificity for DNA and the routine use in Cytology and Hematology. The final score range could be between 0 – 20, whereby a slide is considered to be satisfactory when the final score is at least 12.

The results with Feulgen with Light Green as counterstain and Harris's Haematoxylin were not satisfactory. All other results were classified as satisfactory, with PAP and Modified PAP stains scoring 14 and MGG and Giemsa scoring 12. The higher and maximum score (20) was obtained with Feulgen without counterstain.

Feulgen without counterstain was the preferred method for detecting MN in buccal mucosa cells due to its specificity to DNA.

Pathogenic Fungi: an unacknowledged risk at coastal resorts? New insights on microbiological sand quality in Portugal

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Whilst the potential impact on beach users from microorganisms in water has received considerable attention, there has been relatively little investigation into microbial contaminants in sand.

Between 2000 and 2002, a project involving several national institutions took place, aiming to define beach sand quality parameters and associated methods: “Microbiologic Quality of Coastal Beach Sands”. During this project we split Portugal into 5 regions and from each region 3 beaches were selected: One blue flag awarded (thus with documented good maintenance and water quality), one wild (with the least possible human intervention), and one with documented poor water quality. Samples were collected every 2 months for 13 months. Biological, biochemical and chemical parameters were studied.

In 2006, Portugal initiated a voluntary sand quality microbiological monitoring programme through the Blue Flag association which lasted through 2010. With this activity data was collected which allowed to revise/update the initial project’s results:

Public Health

For this analysis, 33 beaches across Portugal were analyzed during a five year period (2006–2010) to determine the presence of yeasts, pathogenic fungi, dermatophytes, total coliforms, Escherichia coli and intestinal enterococci in sand.

Our results showed that 60.4% of the samples were positive for fungi and that 25.2% were positive for the bacterial parameters. The most frequent fungal species found were Candida sp. and Aspergillus sp., whereas intestinal enterococci were the most frequently isolated bacteria. Positive associations were detected among analyzed parameters and country-regions but none among those parameters and sampling period.

Regarding threshold values, we propose 15 cfu/g for yeasts, 17 cfu/g for potential pathogenic fungi, 8 cfu/g for dermatophytes. Twenty-five cfu/g for E. coli, and 10 cfu/g for intestinal enterococci.

Insecticidal and repellent-treated fabrics as individual protection measure: laboratorial and field efficacy tests

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Vector control is an essential component of today's global strategy for the prevention and control of major vector-transmitted diseases transmitted such as malaria, dengue or West Nile fever. One of the main available strategies is the use of individual protection measures against biting insects which are a nuisance and vectors of disease.

In the present study, fabrics treated with three different compounds (permethrin, DEET and citronella) were tested, in laboratory conditions using a baited tunnel device, to determine their efficacy to prevent *Anopheles stephensi* Liston, 1901 bites. Based on these results, cloths impregnated with the most effective compound were tested in field conditions. Field assays were carried-out in Comporta (Portugal). Additional laboratorial studies with the selected fabrics were performed with *Culex theileri* Theobald, 1903 mosquitoes.

In the first round of laboratory trials, permethrin-impregnated textiles have shown higher levels of repellency than fabrics with micro-encapsulated DEET or citronella. This repellency effect was maintained even after the textiles had been subjected to several washing cycles.

However, the repellency/protection tests conducted in the field have shown that permethrin-impregnated fabric effectiveness is affected by the number of washes. Laboratorial assays performed with *Cx. theileri* indicate that the differences observed in textiles' performance between laboratory and field trials may be due to distinct species-specific behavior of field mosquitoes and *An. stephensi* colony specimens.

Although the use of clothing treated with micro-encapsulated repellents is a promising method to prevent mosquito bites, there is a need to additional investments for textile finishing industries and to produce affordable repellents as well processed with low technology before being implemented as a valid strategy in large-scale vector control.

Among alternative control strategies, there is a need to improve the mode of incorporation and presentation of the active compound on the fabrics in order to obtain a more effective and long-lasting repellent effect. In addition, search for new plant-derived repellents with reduced toxicity and increased repellence is also a desirable factor.

Public Health

Poultry Litter Re-use: Environmental Problem in Portugal?

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In a poultry unit there are a several pollutants, e.g. dried fecal matter and urine, skin flakes, ammonia, carbon dioxide, pollens, feed and litter particles, feathers, grain mites, fungal metabolites, bacteria, viruses and their constituents.

One of the transversal constituent of all poultry units is the poultry litter. The material used as poultry litter may vary between pine shavings, sawdust, eucalyptus or other various types of wood and rice hulls, peanut, coffee, sugar cane, straw, hay, grass and paper processed.

Besides the occupational problems may be associated with poultry litter dust's exposure, the reused of this material as a fertilizer in the agriculture may provide several public health and/or environmental problems. The poultry litter can be used as a fertilizer due it is full of nutrients, however if it is contaminated by chemical elements may accumulate them in the soils, plants or be leached into groundwater. So, this may be a problem to the environment but also to the animals and, consequently, to humans.

Public Health

The aims of this work are 1) to understand the possible origins of poultry litter material; 2) to determine which are the concerns that the poultry farms have with the poultry litters; 3) to understand the differences between a new poultry litter with an already used poultry litter, considering the chemical elements; 4) to determine the possible negative consequences due the re-use of poultry litter contaminated as fertilizer.

The chemical composition of different types of poultry litter (2 samples – one new and other after use) was determined by neutron activation analysis. All samples were irradiated at the Portuguese Research Reactor and measured after 2-3 days and 3-4 weeks, to determine the long-lived radionuclides. The chemical element with the highest concentration determined in the new poultry litter it was La (8.5E3 $mg.kg^{-1}$), followed by Ca (2.3E3 $mg.kg^{-1}$) and Na (5.3E2 $mg.kg^{-1}$). To the other hand the chemical element with the highest concentration in the used poultry litter was Mg (5.7E6 $mg.kg^{-1}$), followed by K (1.5E4 $mg.kg^{-1}$), Ca (4.8E4 $mg.kg^{-1}$), Na (1.7E3 $mg.kg^{-1}$), Fe (2.1E2 $mg.kg^{-1}$) and Zn (4.2E1 $mg.kg^{-1}$). These concentrations do not exceed the available guidelines. However, the existence of different guidelines makes that the interpretation must be done element to element.

The poultry litter can be used as fertilizer to the agriculture because is full of nutrients and is beneficial to crop soil. The problem appears when poultry litters are contaminated by chemical elements. These elements may accumulate in the soils or plants or may be leached into groundwater. Repeating this re-use of poultry litter could load the soils with trace elements above environmental threshold.

Assessment of long term exposure to nitrate in drinking water and methods to address exposure misclassification

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Nitrate is ubiquitous in drinking water. Current guidelines were established to prevent acute effects but health outcomes resulting from long-term exposure to low-intermediate levels are unclear. Accurate exposure assessment is needed to clarify the evidence on cancer risk. Historical levels are usually scarce and assumptions must be applied, probably leading to misclassification. We aim to describe the methods to assess long-term exposure to nitrate in drinking water in four Spanish provinces (Barcelona, Gipuzkoa, Madrid and Navarra) in the context of a multicase control study of cancer (MCC-Spain). Methods to address exposure misclassification are also described.

Historical nitrate levels have been estimated by municipality based on: current and historical information about water source and nitrate levels obtained with a questionnaire from water companies and local authorities, measurements from 2004 to 2010 provided by the National Information System in Drinking Water, and data from websites of local governments. For years with missing levels, available measurements were averaged and back extrapolated to year 1940 using water source as predictor. In municipalities without any nitrate data, we have imputed levels from municipalities with the same supplier and water source.

We have developed an annual score to qualify the reliability of the exposure estimates. For years with known nitrate level, a 0 or 0.75 value was assigned, depending on the number of measurements/year (N>2 or 1-2, respectively). For years with imputed nitrate level based on known source and >10 measurements, an initial 1.5 score was assigned. An increasing value from 0 to 0.25 has been added to penalize the distance/time to the last known measurement. Imputed levels based on <10 measurements were penalized with an additional 0.25 value. When both level and source were imputed (based on data from municipalities from the same water zone), a 2 value was assigned. We have grouped and qualified the reliability as “high” (score ≤0.75), “intermediate” (score 1.5-1.74) and “low” (score ≥1.75).

Public Health

We have designed an exposure assessment model for nitrate in drinking water for 71 years (1940-2010). The study areas included 92 municipalities contributing with 231282 person-years (44.4% Barcelona, 31.0% Madrid, 13.8% Gipuzkoa and 10.9% Navarra). On average, 47.2% (Gipuzkoa), 40.9% (Navarra), 72.1% (Barcelona) and 42.6% (Madrid) of the exposure period was covered with mid to highly reliable exposure estimates. At least 25 years were assessed with high/intermediate reliability in 14 municipalities from Gipuzkoa, Navarra and Barcelona and in 9 municipalities from in Madrid, representing 83.7%, 94.2%, 92.4% and 97.9% of the person-years, respectively. High reliability scores in all areas were mostly frequent after 2001 and were not obtained before 1981. Intermediate reliability scores resulted mostly frequent since 1981 in Gipuzkoa and Madrid and since 1940 in Barcelona and Navarra

Our estimates for long-term exposure showed high reliability in all study areas since 1991. At least, a period of 25 years could be covered with mid to highly reliable exposure estimates in 51 study municipalities (93.7% person-years). Exposure reliability score will be used to weight the cancer risk estimates in the future epidemiological analysis.

Temporal Analysis of the relationship of weather to the flu and pneumonia incidence in São Paulo

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Everywhere in the world, the popular culture associates the alterations in meteorological data - rain, wind, temperature, humidity - with the behavior of human health. Scientific studies have been conducted in the aim to relate the meteorology and climate to the occurrence of human diseases, specifically of the circulatory and respiratory systems. The Sao Paulo metropolis has shown changes in the meteorological conditions due to changes in atmospheric characteristics caused by the release of pollutants, which increased the impact of temperature and precipitation, inducing the number of issues, particularly in domain of a public health.

Analyzing temporal the influence urban microclimate in the onset or aggravation of respiratory diseases, especially influenza (flu) and pneumonia in the city of Sao Paulo for the years 2002 to in 2005.

This study evaluates the effects of micro-meteorological and micro-climate conditions into the human health, using statistical technique of simple regression. The incidence of daily hospitalization of persons with respiratory problems, specifically with influenza (flu) and pneumonia, (obtained in the SUS network) has being relayed with variation in daily meteorological data (obtained by the IAG / USP). It was analyzed a period from January 2002 to December 2005. Data were correlated with daily maximum and minimum temperatures and humidity of the air with minimal rates of hospitalization for influenza and pneumonia, also daily, the National Health System (SUS).

There was high correlation between the number of hospitalizations for influenza and pneumonia in periods of low humidity, maximum temperature increase and decrease in minimum temperature. Between July and September2004, for example, 47% of cases of hospitalization via SUS referred to cases of flu and pneumonia. They also showed that 42% of hospitalizations for influenza and pneumonia are caused by low temperatures observed during the early morning. Since the maximum temperatures during the afternoon, coinciding with the driest periods of the year, accounted for a percentage of hospitalization in about 35%. The correlation coefficients obtained show that there is a clear linear relationship between the variables of hospitalization and meteorological variables. The number of admissions can vary linearly in a certain range of temperature and other exponential or quadratic. The linear regression for these variables is not the most appropriate approach to assess the association between variables, as there are dynamic structures involved in the series, such as trend, seasonality, cycles, which may help explain. The analysis applied here was only the function of identifying the variables with the highest propensity to present the association between meteorological variables and health.

Public Health

For developing the models to simulate scenarios for human health in big cities as Sao Paulo in terms of global warming, modeling techniques are required timeline more sophisticated such as multiple regression or logistic regression.

Water pollution and child labor: Diagnosis and challenges for changes in manufacturing process of Jewelry and Costume Jewelry in Limeira SP

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The XXI century sees, in the setting of economic globalization, the appearance of competitiveness and productivity through strategies of downsizing and outsourcing, which lead to negative impacts on workers and environment. Estimates from Brazilian Institute of Gems and Precious Metals indicate that jewels and costume jewelry production sectors have a high index of informal labor market in Brazil and are an example of a productive restructuring process observed in global economy. The city of Limeira, in São Paulo State, (274,000 inhabitants) embraces the largest jewelry and costume jewelry production and is considered an exporting center in Brazil, with approximately 15 thousand direct jobs and around 500 companies; most of them are small- and medium-sized companies, which favor outsourcing. This paper shows the results from a research that verified the contamination of water bodies and domestic sewerage system arising from this process. In order to get information on the organization of production flow, some families who carry out outsourced production were contacted, and interviews with representatives of the productive chain industries were performed. An X-ray Fluorescence Method was used to collect data and to measure the environmental impact resulting from this production context comparing Limeira city sewerage system to a sample of domestic sewer. The results reveal impacts on environmental health, especially regarding the aspect of water pollution and involvement of children and adolescents in production process stages (assembling, welding, setting, and chemical batch) performed at home. With regards to environmental pollution, electroplating stands out for its water consumption and use of toxic substances, generating liquid effluents and sludge, originating from its treatment. Toxic load of electroplating effluents is composed of cyanide salts and heavy metals classified as Hazardous Waste. Out of 198 costume jewelry companies registered at *Companhia de Tecnologia de Saneamento Ambiental* [Environmental Sanitation Technology Company], only 69 have a liquid effluent treatment system. Samples showing a concentration of Cu (Copper) 117-fold above the control sample, Zn (Zinc) 325-fold above the control sample and also, Ni (Nickel), Au (Gold), Cr (Chromium) and Pb (Lead) 4-fold above the control sample, which characterized the disposal of heavy metals in domestic sewerage systems without any treatment. Besides water contamination, outsourcing part of the productive process to households triggers the social issue of involving children and adolescents in activities that are both dangerous and prohibited by national legislation. 27% of State school students are involved in this production. In order to face this extreme situation, the development of an Intersectorial Network comprised of government agents and civil society is being carried out in order to promote the Elimination of Child Labor.

Public Health

To overcome both of these situations, a re-orientation of this productive flow is necessary to eliminate outsourcings that generate informal and precarious production. With this in mind, interventions involving the business community in a process of changes, as laid down in the "Change Laboratory" method proposed by CRADLE - Helsinki University, seem appropriate to transform the productive arrangement so as to make it sustainable.

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Public Health

Keywords: Environmental Health; Jewelry, electroplating, heavy metal Water Pollution; Child Labor.

Analysis of maternal and child health indicators: expressions of regional inequality in the territory of São Paulo

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Health is a basic prerequisite for economic and social development. Hence, it is necessary to (re)analyse the needs of people living in cities (which are becoming larger and more complex all the time) to ensure the adequate provision of goods and services. In fact, *accelerated urbanization and mobility* has brought new challenges for town planning, and consequently, for public health. Although there have been considerable advances in health indicators in Brazil in recent years, the child mortality rate continues to be one of the biggest public health problems.

To investigate maternal and child health indicators in the state of São Paulo, focusing upon conditions of the geographical context as important variables contributing to inequalities.

The following indicators were used: i) child and maternal health indicators, including the Child Mortality Coefficient (CMC) and Postneonatal Mortality Coefficient (PMC), as well as the percentage of mothers that had had more than seven prenatal consultations in primary healthcare units in the state of São Paulo; ii) socioeconomic indicators from the São Paulo State Social Responsibility Index (*Índice Paulista de Responsabilidade Social* or IPRS). Both were collected from the SEADE (*Sistema Estadual de Análise de Dados*) Foundation database of vital statistics for the period 2006 to 2008.

The Pearson correlations between the CMC/PMC and the percentage of mothers that had had over 7 consultations were quite high (*-0.994* and *-0.952* respectively). This means that CMC and PMC dropped significantly as the percentages of prenatal consultations increased. A CMC of over *16.6 deaths/1000 live births* was found in regions in the north, centre-west and southern littoral of the state (a rate that is considered quite high, as it is above the state average of *13.8 deaths/1000 live births*).
The highest PMCs (over *6 deaths/1000 live births*) were concentrated in the southeast and central regions, Alto Tietê, northern littoral and northeast. Most municipalities in these regions had a low IPRS, providing evidence of regional inequalities as regards maternal and child health in the territory. It was also found that the regions with the highest percentages (above 80%) of mothers that had had live births and over 7 consultations during the prenatal period were located in municipalities in the northwest, extreme west, north, southeast and central regions.

The geographical distributions of the highest CMC and PMC were quite similar, which helps explain the regional inequalities present in this state, particularly because the spatial pattern presented coincides with municipalities where there are low percentages of prenatal consultations and less favourable socioeconomic conditions.

Environmental contamination by feces with zoonotic helminthes, and human infection risk, on footpaths of a protected area

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The Protected Landscape of Bertiandos and S. Pedro de Arcos Lagoons is located in the Coastal Minho, Portugal, where a set of biogeographic factors interact to create a unique environment that includes in 346 ha, hygrophilous woods, wet pastures, lagoons, rivers and pine forests, vital for a diversity of animal and plant species. These features make this area the only Classified wetland in the Northern Portugal. The Area's vertebrate fauna is remarkable in its diversity, with 9 species of fish, 13 species of amphibians, 11 of reptiles, 41 of mammals and 144 of birds registered so far. Along this area, there are several footpaths that are daily crossed by humans that are nature enthusiasts or come for a walk in family, and sometimes accompanied with their faithfull friends dogs. Some animal parasites may also infect humans. Environmental contamination by the feces, should thus be considered a risk to public health. The aim of this study was to estimate the level of environmental contamination by feces with zoonotic parasitic forms in this area. For this purpose we performed coprology analysis (Willis´ Method) to 96 fecal samples (from different animals) collected along the footpaths. We found that 49 (51,00%) samples had parasitic forms, and 42 of 49 (85,71%) were zoonotic (*Ancilostomidae* and *Toxocaridae* eggs, both together in 16 samples). The *Toxocaridae* and *Ancilostomidae* parasites cause the *visceral* and *cutaneous larva migrans* respectively in humans. The nature of these zoonotic parasites suggest the need to implement preventive measures of environmental contamination accompanied by campaigns to promote environment and health education in the community.

Public Health

Design of a pilot plant of biodiesel production from used oil

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The need of renewable and clean energy, to minimize environmental impacts and health damages, forces us to consider technologies as biodiesel production from waste oils. The use of recycled inputs, adds to the productive process of biodiesel new challenges to surpass for cleaning and characterization of the final product. This paper presents the stages followed by the design and construction of a pilot plant for biodiesel production, based on the design and construction of a small test plant. In the first phase, relevant information was compiled and it was built the test plant, which included basically the transesterification module. This first phase allowed to get the details of the batch production process so we can design and implement the components of a pilot plant under local conditions. Thus, the proposal focuses its activities on mechanical design considerations and automation of control processes for biodiesel production in batch mode. Sensors have been implemented in the test plant to the automatic control of the production process. This made it possible to vary the control parameters of production and research on the most optimal mode for the sub sequent construction of the plant, in order to have a continuous production of biodiesel. Previous trials in the small reactor for transesterification of one liter, gave good results. In the second phase, it has been designed and manufactured components, reactors and controls of the pilot plant with a capacity of 50 liters. As raw material will be used primarily waste oil in the vicinity of the Municipality of San Miguel, each production batch obtained will be first tested in their chemical characteristics, that are indicated in the standards of specifications for Biodiesel B100: ASTM D6751-07[a] (March 2007) and then, their quality and combustion efficiency will be tested. Because of that, it is also included the design of an Urban Oils Management used in the community of San Miguel District, where the university is located, in order to prevent water pollution and soil through the use of these wastes. This program includes, among others, the collection and analysis of relevant information in the district of San Miguel, identifying the points of generation of waste oils, the classification of the types of oils, the method of collection and storage of oils and the development of a management plan for waste oils.

Neglected Diseases in the Context of city Campina Grande-PB – BRAZIL.

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The environmental conditions that directly affect the health of individuals, especially in poorer countries. In these, the so-called neglected diseases account for a large portion of the infirmities.

This study aimed to make a general observation about tuberculosis and leprosy are affecting the population of Campina Grande-PB-Brazil.

This is an observational research, longitudinal data from the cases of these diseases for the years 2006 to 2009, provided by SINAN.

The tuberculosis situation in the city resembles the state where it operates, as well as the national reality. Over the years there was observed increase in the number of cases, especially in males, which also has increased the incidence rates, well above the target. In the case of leprosy, the incidence rates are lower than those of tuberculosis, but still make up a situation of national public health problem, since the country is the second in cases of disease worldwide. The incidence of leprosy in Campina Grande, PB, Brazil, has not changed substantially in the period observed in the four years the rate remained above the target of the ministry of health.

Some progress over the years can be observed in fighting tuberculosis, but in cities such as Campina Grande, it is necessary that efforts beyond the distribution of medicines, since the affected population has other difficulties to be overcome. Despite significant progress in leprosy control in reducing the disease burden, there is still much to be done to sustain the gains and continue to reduce the incidence of the disease.

Public Health

Environmental Sustainability in Superior Education: case study of Lisbon College of Health Technology

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Over the centuries there has been a growing trend of societies and it is possible to verify their economic growth. This growth has provided an increased pressure on natural resources, often over-reaching the boundaries of each country, which has called into question the level of environmental sustainability in different countries.

The Superior Education Institutions have a crucial role in building the vision of a sustainable future as a reality, because in transmitting values and environmental principles to his students, are providing that they, in exercising his professional activity, make decisions weighing the environmental values. This ensures improved quality of life.

The present study aims to determine the level of environmental sustainability of the Academic Community of the Lisbon College of Health Technology (ESTeSL), by calculating the Ecological Footprint (EF), and describe whether a relation between Footprint and various socio-demographic characteristics of the subjects (age, gender, address, academic and community groups).

Public Health

In 2011, it was applied a questionnaire online, to a sample of 409 individuals of the Academic Community constituted by students, teachers, non-teaching staff and supplier workers at full-time at ESTeSL, corresponding to 17% of the target population.

The values of the ecological footprint were determined by the answers given by subjects. Each response option presented causes a distinct impact on the environment. Thus, to each response has been assigned a different score, and was given the highest score to responses with greater environmental impact. Subsequently, the total score obtained for each individual questionnaire was converted to global hectares (gha), according to the survey of Group for Environmental Studies of the Escola Superior de Biotecnologia, Universidade Católica Portuguesa.

It was determined that the average value of EF was 5.84 gha. Comparing the value obtained, with a study developed in Coimbra College of Health Technology (ESTeSC), it was concluded that ESTeSL presents an average value below ESTESC (5.90 gha), value of 2008. However, another study published in 2010, shows that ESTeSC had considerably reduced the average value of their EP (4.5 gha). This decrease can be related to the fact that ESTeSC became an Eco-School in 2008.

It was further found that the average value of EF ESTeSL was higher than the last mean value of the national EF (4.5 gha) and the values obtained were much higher than the value calculated for Portuguese biocapacity (1.3 gha) which allow the sustainability of the planet.

For Institutions of Superior Education, such like ESTeSL, to have a proactive role in developing a sustainable future, it is essential that they become environmentally sustainable. Currently, the Academic Community of ESTeSL is not environmentally sustainable, since his EF is greater than the portuguese biocapacity, consuming more resources than those who are produced by Portugal.

With the implementation of the Eco-Schools Programme, this will eventually tend to be changed, as happened in ESTeSC.

Spatiotemporal analysis from a gender perspective of reported AIDS cases in Brazil

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The epidemic of HIV infection is a global phenomenon in evidence, mainly on account of the intensity of damage. In Brazil the AIDS epidemic is revealed as an heterogeneous phenomenon and has undergone significant changes in its epidemiological profile. In this sense, stand out heterosexualization, feminization, interiorization and pauperization of the epidemic. Given these changes, this paper aims to promote a spatiotemporal analysis of reported AIDS cases in Brazil, incorporating, also, an analysis from a gender perspective in cases of virus transmission through sexual intercourse. For this purpose, the "Sistema Nacional de Notificação" (SINAN) of Brazilian Ministry of Health was the primary sources of information used. The paper proposes the recognition of the historical profile and the geographic pattern of spread of AIDS by heterogeneous regions of Brazil, which certainly stands out by providing important support to minimize the damage to populations who are most at risk of contamination by HIV, apart from providing necessary support to the development of policies and other programs for AIDS prevention.

Public Health

Deprivation and excess winter hospital admissions due to cardiovascular diseases in Portugal

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According to Healy (2003) Portugal is the European country with the highest excess winter mortality (EWM). Though, so far, this seasonal burden is still overlooked and any public policy or any systematic quantification of its impact on health has not been set. Several causes may contribute to this; the more fragile populations are very often the most vulnerable to risk situations due to cold exposure, and thus, there are several social, biological, economical risks that may emphasize the environmental conditions. However, still no direct studies on the role of deprivation have been developed in order to understand the extra winter deaths. Meanwhile, during the 2011/2012 winter, the cold spell that have hit the country have led to an increase of hospital emergency admissions and mortality.

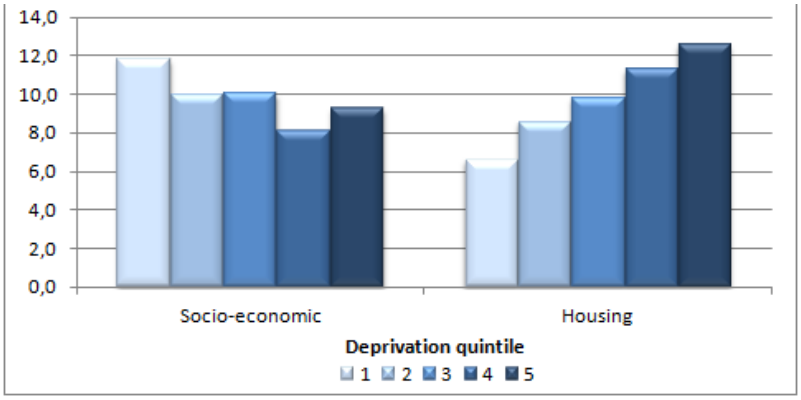
The aims of this study is to evaluate the pattern of the excess emergency hospital admissions due to cardiovascular diseases in Portugal and, to assess some socio-economic aspects and housing conditions that may lead to a better understanding of the winter vulnerability.

Therefore, it were assessed the monthly emergency hospital admissions, from 2000 to 2010, due to cardiovascular diseases, in order to calculate an excess winter hospitalizations index (EWHI), according to the Office for National Statistics methodology. For an evaluation of the determinants of EWHI it were calculated two indexes, a socio-economic index and a housing deprivation index, which were both set up according to the UNDP methodology. Statistical tests were applied to determine significant differences between variables and to understand the magnitude of the winter vulnerability.

So, there were almost 40.000 excess winter emergency hospitalizations in Portugal between 2000 and 2010, representing an increase of 9,6%. The results have also showed that there is a seasonality in all regions and in all age groups; however, it increases with age and it does not assume the same importance throughout the country.

There is a higher excess winter hospital admissions in those municipalities with the worst housing deprivation (p<0,005); but, no significant relationship between the socio-economic deprivation level and the EWAI (p>0,05) was found.

Public Health



Excess winter admission index by deprivation quintile

According to this data, housing conditions are an important factor to understand the vulnerability of seasonality of cardiovascular disease. Our results suggest that it can be expected that people with poor housing conditions are more vulnerable to cold exposure, and therefore with a highest EWHI. These results could help to define public policies directed to the influence of cold weather on health, especially concerning the indoor environment of the poorest housing conditions in Portugal.

Public Health

20 years trend of excess winter mortality in southern European countries

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There is an uneven distribution of cardiovascular morbidity and mortality throughout the year. Scientific evidences have been showing that there is a winter increase in mortality and morbidity, which is higher in those countries with milder winters (Eurowinter, 1997). Excess winter cardiovascular mortality may be the result of several causes, and among them is the exposure to cold.

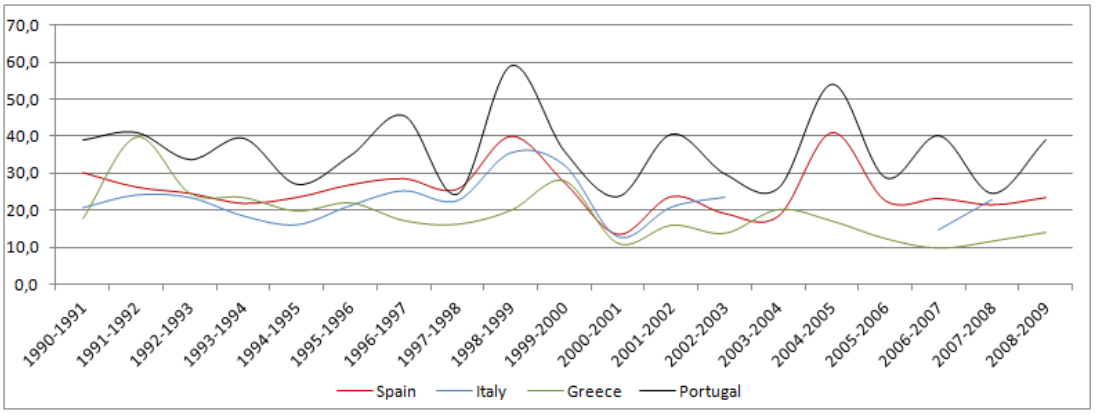
The aim of this study is to identify and assess the incidence trends of cerebrovascular and ischemic heart disease, and the excess winter mortality (EWM) pattern in some European Mediterranean countries: Portugal, Spain, Italy and Greece.

From the national statistics institutions it was gathered two decades of monthly death by cerebrovascular diseases (ICD 10:I60-I69) and ischemic heart disease (ICD 10: I20-I25) in order to calculate the excess winter deaths index (EWDI) and the respective 95% confidence intervals, according to the Office for National Statistics methodology.

There has been a decreased in the cardiovascular mortality; in the Europe 15, since 1990, the cerebrovascular standardize death rate (SDR) decreased 50% and the ischemic heart disease SDR decreased 53%. Despite this evolution, the excess winter mortality, due to these causes, is not following the same trend.

The results have showed that EWDI have a high annual variation in all four countries but they have quite different seasonality patterns. So, since 1990/91, Portugal have been presenting the highest EWDI, and almost every year have obtained a significantly worse outcome than the mediterranean average; and it has reached almost 60% in 1998/1999 which was the year with the highest value while the lowest was recorded, in Greece, for the winter 2006/07 (9.7%). It must be said too that Italy as well as Greece have had always the lower EWM.

Public Health



Excess winter death index due to cerebrovascular and ischemic heart disease

In the Mediterranean countries, though cardiovascular mortality has been dropping, its seasonality is still well evident; and, despite its mild winter, there is a conspicuous excess of winter deaths. Among these countries, Portugal has the highest rates, and has several results worse than Mediterranean average.

These results highlight that although significant efforts have been developed in order to reduce cardiovascular determinants in Europe, its results on the seasonality of the disease are still far from being achieved. One of the possible justifications is that probably other aspects of the epidemiology of these diseases need to be addressed, such as the indoor environment and the reduction of cold exposure.

Influence of a strong static magnetic field of 2.1 T on wing size and shape of *Drosophila melanogaster*

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Different environmental factors have an effect on development, behaviour, physiology and therefore on adaptation of many organisms. Magnetic field is one of the omnipresent stressful abiotic factors, which in complex interactions of other environmental factors has particular importance and could affect different biological systems during their development.

Fly wings are an excellent system for studying morphological variation because of their structural simplicity and many well-defined landmarks suitable for morphometrics. A potential adaptive nature and quantitative variability in different populations made wing size and shape very useful characteristic for considerations of environmental stress effects.

The effect of a strong static magnetic field on wing size and shape of *Drosophila melanogaster* was studied. The first instar larvae of laboratory strains were placed separately to the North (N), namely South (S) magnetic pole and exposed to the magnetic induction of 2.1 T (VINCY Cyclotron magnet) for 2h. Size and shape of the wings were characterized by a set of 15 landmarks and analyzed with the methods of geometric morphometrics. To quantify wing size, it was used centroid size, which is a measure of the spread of landmarks around their centre of gravity.

Observed results indicate the existence of the Drosophila wing size and shape sexual dimorphism. Apparent biological effects of the N and S magnetic poles were not observed on wing size and shape compared to the control group. Results indicated that 2.1 T static magnetic field couldn't be considered as a potential stressor, influencing on wing size and shape during the embryonic and post-embryonic development of individuals.

Public Health

Sand contamination: a public health problem

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The environmental occurrence of fecal indicator bacteria in beach sand has been well documented. However, fecal indicator concentrations in beach sand are not routinely measured despite the possibility that beach sand may act as an important reservoir for microbial contaminants. Besides that, fecal indicators may not be enough to assess sand quality.

Aiming to determine the existent public health problem concerning sand contamination, were analyzed papers from 2005 about sand quality, and also applied indicators.

Some authors suggest that water is an important factor that contributes to sand contamination. Otherwise, others emphasize that sand could deteriorate water quality. Indicators use are different from each study and because of that not easy to compare. Besides that, in some cases indicators applied are the ones use to assess water quality, and aren´t specific to evaluate sand quality.

It's important to ensure routinely measurements to assess sand quality, choosing the best indicators to achieve that goal. Further studies are recommended to evaluate the role of the water contamination in sand quality.

Public Health

Light Pollution and energy efficiency: a case study of the village of Vialonga

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Since industrialization and the formation of large urban centers in the nineteenth century, pollution of the environment was always present in daily life in various ways, namely in the form of light.

Light pollution can cause various consequences, both for humans and for its ecosystem, producing effects on environmental, social, economic and scientific level. Proper use of lighting brings many benefits both to the citizen and environment, since greater energy efficiency can contribute to reducing CO2 emissions, energy costs, as well as to decrease the use of resources not -renewable and / or contamination of renewable resources, which can occurs in the process of obtaining electricity.

The present study has as main goal to analyze the illuminance levels associated to the public lighting of the village of Vialonga, Vila Franca de Xira (Portugal), to verify if it is efficient. The aim is also to relate the efficiency of street lighting with the existence of light pollution.

In Vialonga there are 2929 luminaires equipped with a total of 3025 lamps with a total output of 408581W. For this study were selected twelve roads, three of type "avenue" and nine of type "street" as a sample of 209 streetlights equipped with sodium vapor lamps of 150W high pressure. The data collected consisted in the illuminance levels and the distances between poles, their height and width of the roads. In order to prevent that the moon had any effect on the values collected, measurements were made in the new moon phase and without any cloudiness, at every twenty meters in the track, at a distance of one meter of the floor.

The standard EN 13201 establishes reference values for illuminance, in lux, by type of road. To the "streets" is considered an illuminance of 15 lux, and for "avenues" the illuminance value is equal to 20 lux. The assessed illuminance in Streets and Avenues exceeded the reference values defined by EN 13201, with 19.17 lux and 25.62 lux, respectively.

The analysis of data showed one difference of 3.47% illuminance wasted between the new (42.01%) and the old (38.54%) zones, and in the most recent zone it was evident the greater percentage of wasted illuminance.

Although it is in the older zone that occurs higher illuminance (23.15 lux against 17.47 lux). Therefore, it was considered that the older area of Vialonga has a better utilization of light, since it proves to be more efficient.

An inefficient lighting system may contribute to the energy wasted and thus to lighting pollution. The advantages of an efficient public lighting system are reflected in several aspects. Efficient use of public lighting system will be an added value for economic and environmental and even social aspects.

The results obtained in this study showed that, there is a wasting of 40% of illuminance in the illumination system. This wasting, besides contributing to light pollution, will have an effect on the economical aspect, because there is energy consumption, without useful lighting.

Effect of chronic exposure to alternating magnetic field (50 Hz, 0.5 mT) on the activity of serotonin receptors in the brain of rats

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Living organisms are constantly exposed to magnetic fields of different characteristics (type, frequency, intensity), and accordingly any change of this ecophysiological factor could have an impact on their functioning. In addition to natural magnetic fields, there are artificial magnetic fields that are a consequence of intensive industrial and technological development. Some of them are alternating magnetic fields of extremely low frequencies (<300 Hz) derived from power lines, household appliances and different industrial technologies. It is known that serotonergic neurotransmission, among other things, has an important role in response to various external and internal stimuli.

The purpose of this study was to examine the effect of chronic (lifelong, from conception to 3 months old) exposure to alternating magnetic field (50 Hz, 0.5 mT) on the activity of serotonin receptors in the prefrontal cortex of male Wistar rats. An electromagnet with a regular laminated transformer core was used for generation of alternating magnetic field. It was supplied with a sinusoidal current (50 Hz, 40 V, 4.5 A). After cessation of magnetic field exposure, the affinity and density of serotonin 5-HT_{1A} and 5-HT_{2A} receptors were determined by *in vitro* radioligand receptor binding assays.

It has been found that chronic exposure to alternating magnetic field (50 Hz, 0.5 mT) modulates the affinity and has no effect on the density of examined serotonin receptors. Significantly increased ($p<0.01$) affinity of serotonin 5-HT_{1A} receptors and significantly decreased ($p<0.05$) affinity of serotonin 5-HT_{2A} receptors in the prefrontal cortex of exposed animals were detected.

These findings revealed the ability of alternating magnetic field to modify the affinity of central serotonin receptors. This could have an impact on many processes mediated by these receptors such as motor activity, learning, memory and mood, and therefore they should be thoroughly examined.

Public Health

Effect of static magnetic field (2.1 T) on antioxidative defense system in *Drosophila subobscura* (Insecta, Diptera)

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Living organisms are highly complex dynamical systems which are inextricably linked to their environment. Each individual is under influence of a complex of ecological factors (both biotic and abiotic ones). Among them, omnipresent magnetic fields represent important abiotic factor, which could affect different biological systems. Considering the increase of electromagnetic pollution, as a consequence of modernization of life, additional magnetic fields (static and alternating) are common in the living environment. Therefore, the interest for studying the biological effects of magnetic fields of different characteristics has also been increased.

Magnetic fields can affect insects, causing a wide range of responses. Some of these seem to be partly mediated through free radical reactions that are able to alter cell defense system and breakdown tissue homeostasis. Enzymes (superoxide dismutase – SOD, catalase – CAT, glutathione S-transferase – GST, glutathione reductase – GR, ascorbat peroxidase and dehydroascorbate reductase) and non-enzymatic components (glutathione, ascorbic acid and α-tocopherol) constitute the major antioxidant defense system against reactive oxygen species in insects.

The main purpose of this study was to analyze the activity of antioxidative defense (SOD, CAT, and total glutathione content - GSH) in laboratory strains of *Drosophila subobscura* (Insecta, Diptera) originating from oak and beech forests after exposure to the North (N), namely South (S) pole of static magnet (2.1 T, VINCY Cyclotron magnet).

The experimental groups were: *sham*, exposed to the N and S magnetic poles. The first instar larvae were exposed to the magnetic field for 2h. The effect of N and S magnetic poles on antioxidative defense in the homogenates of Drosophila adults was measured.

Exposure to static magnetic field (N and S poles) decreased SOD activity and total glutathione content and increased CAT activity in *D. subobscura* originating from oak forest. In contrast, in *D. subobscura* originating from beech forest, the N and S magnetic poles increased SOD and CAT activity, as well as decreased the total glutathione content.

According to the results, it can be stated that examined Drosophila adults, which the first instar larvae were exposed to static magnetic field, have specific response to the N and S magnetic poles.

Housing and health

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Exposure to certain hazards in housing can endanger the physical and psychological integrity of people who inhabit them, or can influence their health and wellbeing. So it becomes imperative to assess the living conditions and to understand how they can affect those who face it every day. In order to understand whether the age of dwellings and the distance to the county seat influence the living conditions, a study was carried out to homes with more than 30 years and less than 30 years in the municipality of Arganil in two parishes (away and another one near the county seat). Through questionnaires and, in addition, analytical assessments of certain components in the air, we tried to understand the reality of these settlements and housing if the housing conditions can influence health and well-being.

After treatment in specific program and analyzed the data obtained, it can be concluded that, in general, health and well-being is related to housing conditions, and the latter with distance from the seat of the county and at the age of the dwelling.

Public Health

Production of low frequency noise in highways and railways

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Science has divided the acoustic spectrum in a very simplistic way, in infrasound, audible sound and ultrasound, considering as potentially dangerous acoustic phenomena the infrasound and audible sound. This study had as main purpose assess which levels of infrasound and low frequency noise are produced in road and rail network in the city of Coimbra and has a second purpose determine which are the physical, environmental and technical means that can influence the noise spreading. To achieve this, we carried out a study on the nature of cross-sectional cohort and the type of study considered was descriptive and correlational (level II). We considered the target population the road network existent in Coimbra district, where the sample design was defined as non-probabilistic sampling technique and rationale for selection or typicality. The sample was constituted by 31 road and rail vehicles. The study had the duration of three trimesters and the period of data collection occurred between the second half of may to the first week of June. The data collection developed in two stages, consistent with the study purposes. To the first stage was elaborated a registry datasheet and it was used the Brüel&Kjær model 2260 soundmeter equipped with the software BZ 7108 FFT and to the second phase was used the same soundmeter equipped with the software BZ 7210. The data collected were statically analyzed using the data processing software SPSS version 17.0. It was used also the statistical tests One-Way ANOVA, T-test for equality of means; and Pearson Correlation test. The statistical tests interpretation recurred to the base level of significance of α=0,05, with a level of confidence raging 95%. With the realization of this study can be concluded that the low frequency noise produced in road and railways do not represent a single pattern, being subjected to the influence of several variables as “type of traffic”, “type of road”, “road conditions”, existence of “watercourses” in the vicinity of the places with *road* and *rail* traffic, type of “vegetation cover”, the “approximate height of the buildings” surrounding the locations where the measurements where made and the existence of different types of “noise barriers”, depending on the frequency and on the time of day analyzed. It can be also concluded that there is risk of Vibroacoustic Disease development in populations living in the analyzed locations, and this risk is increased near railways. These results prove that Vibroacoustic Disease is not restricted to occupational exposures and should be seen as a public health problem.

Public Health

Radiation of Electromagnetic and Cellular Sources: Objective and Subjective Information

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Malraz, Council for the Prevention of Noise and Air Pollution in Israel, is the first environmental association founded in Israel (in 1961). Malraz takes care of nuisances resulting from noise, radiation, ground, bad odors and environmental pollution of air, water and sea and encourages and promotes enforcement of laws designed to protect the environment and abate nuisances. Malraz is officially authorized by ilac-MRA as a laboratory of radiation in an international standard, measuring 17025 standard.

Malraz monitors the levels of radiation emitted from cellular antennas (centers) as well as from electric sources (electricity poles, high voltage poles, transformer rooms, electricity cabinets etc). Malraz monitoring service is performed by qualified professionals: engineers, practical engineers and technicians and through special mobile units and professional equipment that has been approved by the government (PMM sensitivity of 0.3 V/M; 300 kHz3 GHz for RF and sensitivity level of 0.01µT; 10Hz - 5kHz for ELF). The tests are performed at places where people are living – at the bedroom, at the classroom etc at a given time in various places, and a fixed device that continuously measures radiation level during several days, in one place.

Malraz launched a special national call center which handles all requests for radiation tests made by citizens of Israel (8,000,000) which coordinates the tests and publicizes the findings via the internet under full transparency, which allows citizens to know the radiation levels in their place of residence and compare them with other places in Israel.

Malraz's activities concerning radiation are performed with the public and opposite local authorities subsequent to being contacted, receiving a written order and following full coordination with all relevant parties (private houses, offices, school principals, kindergarten teachers, clinic managers etc.).

In the years 2009 – 2011 Malraz has been examined 3,388 locations of radiation of cellular sources (RF). In 97.5% of the cases the radiation level was lower than 2.5 MW for SMR. The laws allow 40 MW for SMR. Only 2.5% of the cases indicated a level between 2.51% and 40.00 MW for SMR.

Unlike the RF examinations, the examinations of radiation of electric sources (ELF) indicated that out of 1,098 cases examined in the years 2009 – 2011 only in 56.10% of the cases the radiation level was lower than the allowed level (2 mG during 24 hours in average and maximum of 4 mG). Thus, in 45.90% of the cases a higher level of radiation was found. Of them, 22% are exposed to a radiation of 10-300 mG (normative radiation from a magnetic field (which is not in proximity of a large electricity device) does not exceed 1 milligauss).

These findings are striking, as the public is not aware to the extent of the problem and the danger that citizens are exposed to in everyday life. We assume that these findings must be very similar in other modern countries and suggest to establish these examinations everywhere.

Noise Exposure In School Ambient

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Noise is a factor that is achieving more and more importance, focusing on the repercussion for human health and the consequences that this entails. The human ear reacts differently to frequencies, thereby, is not only the intensity of the noise that makes it dangerous but also the exposure time itself. In this sense, it is important to make an assessment of exposure to noise in a school, not only on the slope of the students, who are the future and it is imperative to provide an appropriate learning environment, but also in a strand of teaching and non-teaching that give their contribution to provide the best for the students every day. Studies show that there are learning difficulties for students and voice disorders and increased physical stress of teachers in noisy environments. In this study, which aimed at evaluating the noise levels in the school environment, we proceeded to a sample of nine schools in the area covered by a health group centre, Agrupamento de Centros de Saúde Oeste Norte "ACES", with a convenience sampling. Noise measurements were made in classrooms, gyms and cafeterias of the schools in this research to calculate the levels of noise to which students, teachers and non-teachers are subject to a normal day of classes.

The data were statistically worked in accordance with the statistical software SPSS version 17.0 and Decree-Law No. 182/2006 concerning the calculation of LEX, 8h.

It was found that teachers and non-teachers do not reach the exposure limit values upper and lower action established by legislation in relation to noise exposure and the students the level of noise they are exposed is higher than recommended by the World Health Organization (WHO), leading to discomfort.

Public Health

Trihalomethanes formation in indoor swimming pools: temporal variation, health risk classification and lab scale study

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Characterization of water quality from indoor swimming pools (ISPs), using chorine based disinfection techniques, was performed during a six month period (April-June and September-November 2010) to study the occurrence, distribution and determining factors of trihalomethanes. Several parameters such as water total trihalomethanes (TTHMs), water (CF_W) and air chloroform, water bromodichloromethane (BDCM), dibromochloromethane (DBCM) and bromoform (BF), free residual chlorine (FrCl), pH, chloride (Cl^-), conductivity (Cond), water and air temperature (T_W; T_{Air}) and permanganate water oxidability (PWO) were determined in each pool, during that time. CF_W was the THM detected at higher concentrations in all pools, followed by BDCM, DBCM and BF detected in 99, 34 and 6% of the samples, respectively.

Evaluation of THMs throughout the 6 months showed significant differences for CF_W, BDCM and TTHMs medians, presenting smaller concentrations in September. Other significant differences were observed for Cl^- and Cond medians with smaller values also in September, and for T_{Air} which presented higher values in June. THMs, Cl^- and Cond results can be explained by the reopen of pools in September, after their closure in the summer, which is probably accompanied by a dilution of pool water with fresh water or by a total replacement of pool water and by newly disinfection procedures.

Several significant correlations were observed between TTHMs and other parameters, namely CF_W, T_W and PWO, which indicate that T_W and the amount of organic matter are, indeed, parameters that influence THMs formation.

Exposure criterions were defined for water quality in ISPs: low exposure (<20µg/L), moderate exposure (20-50µg/L) and high exposure (>50µg/L). An exposure criterion, established by other authors, was also used for air quality: 33, 36 and 136 µg/m^3 for low, moderate and high exposure, respectively.

Public Health

The exposure criterion established for water trihalomethanes enabled the inclusion of 67% of Lisbon pools in the high exposure group, which reinforces the need for an improvement in pool water quality. In air, 24% of the samples presented CF_{Air} concentrations higher than 136µg/m^3. Once more, it is clear that several indoor pools need extreme changes in their internal procedures.

A lab scale study was designed to mimic a real ISP: disinfectant, organic matter, FrCl, T_W and pH were controlled in order to monitor TTHMs, total organic carbon and total nitrogen content. A body fluid analogue (BFA) was prepared to represent organic and inorganic matter components derived from human contamination. Three experiments were performed to study the influence of T_W and BFA on THMs formation. The main conclusions are that, with a proper and periodic control of disinfection, it is possible to maintain water pH, FrCl and TTHMs in acceptable levels, according to WHO guidelines and Portuguese legislation.

Public Health

Ecological study of the association between teenage pregnancy rates and socioeconomic characteristics of municipalities in São Paulo State, Southeast Brazil: a Bayesian analysis

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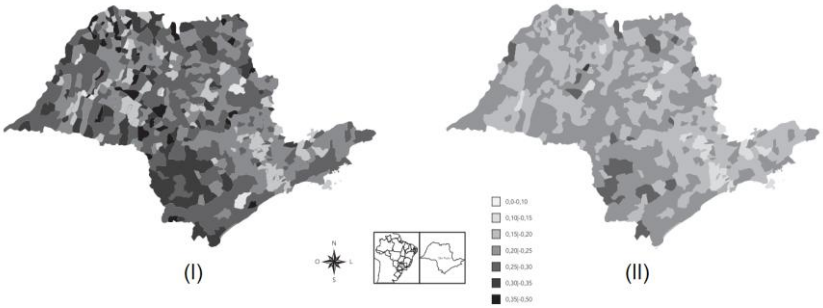
Teenage pregnancy is a common public health problem worldwide, given its high prevalence. The objective of this ecological study was to study the spatial pattern of association between the percentage of teen pregnancy in each of the municipalities of the state of Sao Paulo – Southeast Brazil, in 2007, and the socioeconomic characteristics of these municipalities. We used a Bayesian model with a spatial distribution following a conditional autoregressive (CAR) form based on Markov Chain Monte Carlo algorithm. For adjustment of the model, we used the WinBugs computer program in the GeoBUGS module. Data on teenage pregnancies were obtained from the SINASC Information System and socioeconomic characteristics of the municipalities were obtained from the Brazilian Institute of Geography and Statistics (IBGE). The model showed that the occurrence of early pregnancies is higher in municipalities with lower Gross Domestic Product (GDP) per capita, a higher incidence of poverty, lower population size, lower human development index (HDI) and a higher percentage of individuals with “Sao Paulo social vulnerability index” equal to 5 or 6 (more vulnerable). Teen pregnancy was less common in large cities, regions characterized by greater supply of health services and income per capita, but where there are still segregation, poverty and social inequality. The study demonstrated a close association between teenage pregnancy and social and economic indicators. The direct interventions on vulnerable groups of adolescents are of great importance for the prevention of early pregnancies, but the findings of this study suggest that the problem has broader dimensions and more efficient results were obtained from actions that enhance or optimize resources municipalities in order to compensate for social differences. The maps in the Figure show the spatial distribution of the crude (I) and adjusted (II) percentage of teenage pregnancy in the municipalities of São Paulo, Brazil.



Public Health

Ecological study of the tuberculosis incidence in the urban area of Ribeirão Preto, Brazil, and its relationship with measures of social vulnerability

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The purpose of this ecological study was to evaluate the urban spatial and temporal distribution of tuberculosis (TB) in Ribeirão Preto, Southeast Brazil, between the years of 2006 and 2009 and to evaluate its relationship with factors of social vulnerability such as income and education level. We evaluated data from TBWeb, an electronic system for notifying TB cases. Measures of social vulnerability were obtained from SEADE Foundation and information about number of inhabitants, education and income of the householders were obtained from Brazilian Institute of Geography and Statistics. Statistical analyses were conducted by a Bayesian regression model assuming a Poisson distribution for the observed new cases of TB in each area. A conditional autoregressive (CAR) structure was used for the spatial covariance structure. The Bayesian model confirmed the spatial heterogeneity of TB distribution in Ribeirão Preto identifying areas with elevated risk and the effects of social vulnerability on the disease. It was evidenced that the rate of TB was correlated with the measures of income, education and social vulnerability. However, it was observed areas with low vulnerability level and high education and income levels, but high estimated TB rates. The study identified areas with different risks for TB, allowing that the public health system deals with the characteristics of each region and prioritizes those that present higher propensity to risk of TB. Complex relationships may exist among TB incidence and a wide range of environmental and intrinsic factors, which need to be studied in future research.

Public Health

Assessment of the multilevel risk factors of Overweight

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Obesity is a social problem that has reached epidemic proportions in developed countries. It has traditionally been associated to biological, genetic or behavioural factors, such as increased sedentarism and the consumption of sweet fatty foods. Although individual factors have been shown to predict weight gain, contextual determinants have also attracted attention, with some authors stressing the role played by deprivation, urban sprawl, social capital and safety. "Obesogenic" environments are those which are conducive to weight gain by encouraging the intake of excess calories and/or discouraging energy expenditure in daily routines. It is therefore important to identify the factors involved in the emergence of these environments, using a multidisciplinary approach. This study aims to highlight the associations between residential (physical and social) environment and the risk of weight gain and obesity, over and above individual attributes. Assessing which indicators are the best predictors of Lisbon Metropolitan Area residents excess weight, specifically factors more related to urban planning and therefore potentially changeable. The study involved data from 7669 individuals, aged 18 and over, from 143 neighbourhoods, collected by the National Statistics Institute. Self-reported body height and weight were used to define overweight body mass index (BMI >= 25). BMI and individual (socio-demographic and behavioural) characteristics were linked to contextual data and analysed in a multilevel framework. Our findings show that different environmental factors are significantly associated with excess weight and obesity, either directly or indirectly (e.g. health-related behaviours such as eating patterns and physical activity, which are key mediators), after adjustment for individual characteristics. Adjusting for individual attributes, urban sprawl (lower population density), inadequate housing (shanties) and unsafe environment (violence measured through crimes against property and traffic accidents involving victims) show a positive association with BMI; the higher these area disadvantage characteristics, the higher the individual BMI. The availability of supermarkets and post offices reduces the odds of being overweight, as do social cohesion and public health services. In addition to the positive relation between urban sprawl (low population density) and excess weight, reported above, the interaction between living in the higher population density tercile and more deprived areas showed the opposite trend, increasing the odds of being overweight. We conclude that the risk of being overweight or obese depends not only upon individual factors, such as sex, age, physical exercise and diet, but also upon contextual factors. The results suggest that a deeper understanding of these mechanisms is critical if we want to tackle the obesity epidemic, and that policies aimed at weight control and obesity reduction must address people and places in order to bear fruit.

Public Health

Children's health and environment factors: an overview of the effects of urban environment on childhood chronic diseases

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The number of children suffering from chronic health conditions has increased rapidly over the past few decades. A wide range of chronic diseases, formerly found among adults, have been diagnosed in children. Childhood chronic diseases could affect the children and their family's daily life throughout childhood, and some may have permanent impacts into their adulthood. Numerous studies have investigated the associations between environment and chronic diseases and found that if coupled with the sensitive responses of children to surrounding environments, the environmental effects on childhood chronic diseases were likely to be detected. However, systematical reviews on the associations between childhood chronic diseases and urban environment are lacking. This study is to systematically review previous researches on the effects of urban environment on childhood chronic diseases, identify research gaps, and suggest future studies.

This study will systematically review the journal articles on childhood chronic conditions and urban environment. Database such as PubMed, ISI Web of Science, Scopus, Elsevier, PsycINFO, CINAHL, Springer, NetLibrary, and Wiley will be searched. Chronic diseases such as chronic respiratory disease, cardiovascular diseases, immune diseases, diabetes, hypertension, cancer, obesity, and behavior/learning problems in children will be included. A set of criteria will be developed to identify relevant high quality empirical studies.

By summarizing possible data sources and previous research findings, this review will provide an overview of the researches on urban environment and childhood chronic diseases. The prevalence of childhood chronic diseases will be summarized and compared across different regions. The gaps and challenges of researches in children will be identified. A theoretical model of children's health and environment factors will be proposed. Further research directions and international collaborations will also be suggested.

Public Health

Community strategies against *Aedes aegypti* : going backwards in vector's Europe invasion

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In 2005, following population complaints about severe allergic reactions, Aedes aegypti Linnaeus, 1762 was detected for the first time in Madeira Island. During subsequent years, the species thrived, expanding its distribution area throughout the Island. Since this mosquito is one of the most competent vectors of yellow fever, dengue and chikungunya arboviruses, there is a potential emergence of these infections. An outbreak will represent a public health and economic threat for the island. Having no vaccines or treating drugs against dengue and chikungunya virus, Ae. aegypti control remains the cornerstone for the prevention of these illnesses. Moreover, Ae. aegypti presence in Madeira represents an open-door for its introduction in other territories such as Western Europe. In this scenario, strategies to decrease Ae. aegypti abundances are mandatory. Vector control measures based on breeding site reduction are known to be the most efficient. This mosquito breeds in water, preferentially in small domestic containers. Therefore, community involvement is crucial to its elimination. However, effectiveness of community-based approaches is always dependent on its suitability to the target human population and the territory.

In this work we aim to characterize Madeira situation regarding: (i) the distribution area and type of breeding sites used by the vector species, and: (ii) the knowledge attitudes and practices of the human population towards the mosquito.

Aegypti's distribution area was assessed by mosquito collectyion with ovitraps. A survey was conducted, from October-December 2012, among two of the most infested parishes in Funchal. According to a stratified sampling, 730 human subjects were randomly selected. Breeding sites inventory of their houses were performed and face-to-face questionnaires regarding mosquitoes and dengue fever were applied.

Sample of study were represented by 289 male (40.3%) and 428 female (59.7%) subjects. The average age was 55.1 years (SD=18.34 years, min=18 years and max=91 years). From all respondents, 32.0% were illiterate or Fourth Grade graduated , 23.8% studied until Ninth Grade, 19.4% finished High School and 24.8% achieved Graduation, Bachelor, Master or upper education.

Public Health

The presence of small water containers was frequently associated with mosquito occurrence (83.2%) but only one third of those respondents (29.5%) consider that mosquitoes can breed insides houses. This could mean that even though people identify that water is essential for mosquito's reproduction, part do not recognise the need to avoid mosquitos development inside their own domestic domain. Consequently, the relevance of personal involvement as part of broader approach to aegypti control may be underestimated. Food debris (44.0%) or pets (36.1%) are believed to be other breeding-mosquito contributors. These high frequencies show that people's concern is dispersed, loosing focus on real breeding sites. The most prevalent "potential breeding sites" were flowerpots' dishes, present in 61.7% of all visited houses, followed by laundry tanks (27.0%).

These findings will guide future strategies for community education. Misunderstood information or myths yield by the local population should be clarified in order to achieve a higher commitment of the population in the vector control strategies.

Different genotoxic effects of multi-walled carbon nanotubes in A549 cells: implications for nanomaterials safety investigation

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Human exposure to nanomaterials (NM) has been increasing worldwide, either due to the growing of environmental sources or from increased deliberated production for application in consumer products and nanomedicine. In particular, single- and multi-walled carbon nanotubes (MWCNT) have been developed for industrial purposes, and their safety must be assured. The same properties that render MWCNT-based materials so attractive may also cause higher toxicity. In particular, the similarity, in size and shape, between MWCNTs and asbestos fibres has raised concerns about their potential effects in human health. Moreover, contradictory results concerning their genotoxicity and carcinogenicity have been reported and further safety assessment is urgent. The objective of the present work was to characterize the potential cyto- and genotoxic effects of two MWCNTs (NM402 and NM403) in a human type-II alveolar epithelial cell line (A549).

Dispersions of each NM were freshly prepared and cultures were exposed to NMs concentrations ranging from 0.52-52.08 µg/cm^2. The clonogenic assay was used to determine *in situ* cell survival (8-days exposure) and the cytokinesis-block micronucleus assay was carried out (48h-exposure) to evaluate genotoxicity. Concurrent control cultures were also analysed: vehicle control, positive control (mitomycin C, MMC) and reference NM (ZnO-NM110).

The results of the clonogenic assay showed that both NMs induced a concentration-dependent reduction of the cell survival with IC_{50} of 25.15 and 27.63 µg/cm^2 for NM402 and NM403, respectively. The highest concentrations of NM402, 26.04 and 52.08 µg/cm^2, induced a 2-fold significant increase in micronucleated binucleate cells (MNBCs) compared with the vehicle controls (P=0.006 and 0.019, respectively). Regression analysis indicated a concentration-response relationship that was best fitted to a linear-quadratic model (R^2= 0.861). However, no concentration-response relationship in MNBCs was observed for NM403. The cytokinesis-block proliferation index (CBPI) remained unaltered following A549 cells exposure to NM402 or NM403. The positive controls, MMC and ZnO significantly increased MNBCs frequency and concomitantly decreased CBPI.

In summary, while both NMs were cytotoxic for A549 cells, their ability to cause DNA damage was distinct. NM403 was not genotoxic while NM402 caused a dose-dependent genotoxic effect, which may be related to a potential carcinogenic activity. The differences observed may be explained by structural differences between the two MWCNTs. Although both present low diameter, they differ in length, being NM402 the longest.

Public Health

Thus, the result of lower genotoxicity of NM403 is in line with the fibre paradigm of CNT toxicity, whereby the length would be critical to their toxic potential. However, the NMs also differ in the types and contents of impurities, being NM402 the less pure (>90%), which may contribute to the observed genotoxicity.

Regarding safety assessment, the different genotoxicity observed for these two closely related NMs highlights the importance of investigating the toxic potential of each NM individually, instead of considering a common mechanism responsible for CNT toxicity, since physical-chemical characteristics are recognized as important toxicity determinants.

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Playful Workshop on Children's Environmental Health in two schools in the city of Rio de Janeiro, Brazil

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The present study was developed in 2 public schools located in the city of Rio de Janeiro/Brazil and aims to propose an information methodology and a critical reflection - with a playful approach- on the relation between health and environment, specifically for children. Schoolchildren aged between 8 and 10 years were participants in the study. The study was carried out in 3 stages: the construction of a methodological proposal of educational activities for children's environmental health, the dynamics of administration of workshops directed to schoolchildren and the evaluation of the activities developed among teachers and principals of the participant schools after 1 year. For such, a qualitative approach was adopted. Data were collected through observation, participants and in-person interviews. The pedagogical conception was based on Paulo Freire and Vygotsky referentials. The research showed that the application of an educational methodology through games and class dynamics is a learning tool to be used by educators/health professionals in their school routine, since the advances obtained through the sensitization presented by the students following its use were relevant. The results highlighted the need for the implementation of Environmental Education and Health Projects that may associate several authors for the creation of health-favorable environments, in special for the school community. Finally, we consider that the product of this study, the Playful Workshop in Environmental Health is worth of replication and, as a secondary gain, can be adequate for the qualification of Education and Basic Healthcare professionals with wide application in a school setting. It is important to point out that territory must guide the improvement of the methodology features and consequently, bringing students into an active participation in the project in the way they are naturally interested in, a playful way that can facilitate the understanding of a health-oriented Environmental Education that may incorporate health promotion practices.

Public Health

Management Systems – Retrospective evolution of certification

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During the last years a new organizational culture in Europe has been arising, concerning the management paradigm. Initially, limited to the industrial sector, but quickly spread to other activity sectors. This spreading resulted essentially from the economic globalization process and progressively competitive markets, which led to a lot of organizations implementing more comprehensive quality management systems, environmental management systems and safety and occupational health management systems. Being a strategic decision of high importance for the competitiveness and for the survival of the organizations, the diffusion of management systems already hit values, on 31 of December 2010, about 1.110.000 organizations certified according to ISO 9001, 251.000 according the ISO 14001 and 54.000 on the OHSAS 18001 (on 31 of December 2010). There was a very significant increase of ISO 9001 and ISO 14001 in all regions, especially in Europe and Far East. However, Europe could not keep up with the trend, observing a sharp decrease in both standards. It was also found that the diffusion of management systems begins to decrease, as a result of the saturation state of the market in terms of certification. In the present article it will be presented the retrospective evolution of management systems certification worldwide and in Europe as well as forecast for this evolution.

Microbiological monitoring of water for control of *Legionella*

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Legionellosis is a collection of infections that are caused by *Legionella pneumophila* and related Legionella bacteria. The severity of legionellosis varies from mild febrile illness (Pontiac fever) to a potentially fatal form of pneumonia (Legionnaires' disease) that can affect anyone, but principally affects those who are susceptible due to age, illness, immunosuppression or other risk factors, such as smoking.

Legionella spp. are heterotrophic bacteria found in a wide range of water environments and proliferate at temperatures between 25°C and 45°C. These bacteria are members of the natural flora of many freshwater environments, such as rivers, streams and impoundments, where they occur in relatively low numbers. Bacteria of the genus *Legionella* are ubiquitous, they can proliferate in certain human-made water environments, such as water cooling devices associated with air conditioning systems, hot water, spas, distribution systems, on the inside surfaces of shower heads especially in warm waters. Legionellae can be ingested by certain amoebae which play an important role in their persistence in water environments.
Devices that support multiplication of *Legionella* have been associated with outbreaks of Legionnaires'disease.

Nosocomial cases usually make up a small proportion of reported cases of legionellosis. However, the proportion of cases that are fatal tends to be much higher with nosocomial infections than with community-acquired infections.

Health-care facilities may include environments that support the proliferation and dissemination of *Legionella* and must be monitored.
In Portugal only exists legislation for air conditioning systems and thermal waters. It is important to be aware of the need to develop specific rules for the detection of *Legionella* in water intended for human consumption in order to act more for the prevention of the disease than to act only in the monitoring of an outbreak.

In recent years there has been an increasing incidence of disease caused by this bacterium, atypical pneumonia, and a large variety of water systems are different sources of contamination.

Children's play paints and cosmetics: a potential source of toxic elements (metals)?

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Toxic elements can be found in many products used in the school environment and their presence may present a potential source of hazards for young children. Children´s play paints (finger-paints, gouaches, acrylics, water paints) and decorative cosmetics are commonly used as didactic products in preschool activities. These products composition include a wide range and variety of natural and synthetic substances, such as pigments, solvents, water, preservatives and fragrances, that are directly applied to human skin contributing to a local exposure. Pigments are mainly used to provide colour, opacity and certain characteristics to the paint and are generally present in large amounts in these products. The paints toxicity greatly depends on pigment type used in the colour formulation, which is normally associated with potential toxic elements such as metals. Some metals are intrinsically associated with the pigments as zinc (Zinc oxide, ZnO) and others can be retained as impurities in the pigments, for instance lead, cadmium, cobalt, copper, chromium and nickel. Though, the European Union (EU) laws for cosmetics banned some of these metals as ingredients in cosmetic products, there is no orientations when they occur as impurities. Children in preschool, under the age of 5 years, are particularly vulnerable to these elements, since they still are in a physically development stage. At this age, gastrointestinal and dermal absorption occurs more effectively than in adults.

The aim of this study was to evaluate the content of the metals: lead (Pb), cadmium (Cd), chromium (Cr), cobalt (Co), nickel (Ni), manganese (Mn), copper (Cu) and zinc (Zn) in play paints and cosmetics. Were studied 32 paints (gouaches, acrylics, finger-paints and water paints) and decorative cosmetics collected in 8 preschool establishments (21 samples) and purchased in 3 low cost stores (11 samples). The content of Pb, Cd, Co, Cr and Ni was measured using the graphite furnace atomic spectrometer (GFAAS) system and the content of Mn, Cu and Zn was measured using flame atomic absorption spectrometry (FAAS). The analyses were preceded by microwave-assisted acid digestion (nitric acid, HNO3) of each sample.

Public Health

The results revealed the presence of Cr in all samples. In general, the products purchased in low cost stores presented higher concentrations of this metal, ranged between 0.76 and 9.40 mg Kg-1. Concentration of Cu and Zn were above the concentration limits (156 mg Kg-1 for Cu and 938 mg kg-1 for Zn) imposed to paints as toys, in five and two samples, respectively. The values ranged between 7.05 and 1458.16 mg Kg-1 to Cu and between 2.46 and 29687.46 mg Kg-1 to Zn. The highest concentrations of Zn were also detected in products purchased in low cost stores. In decorative cosmetics were detected Pb, Cd, Cr and Ni, all of them forbidden by the Cosmetic Products Directive (76/768/EEC).

The presence of metals in play paints and cosmetics represent a category of potentially toxic elements that should not be neglected, taking into account, the susceptibility and vulnerability of the target group, namely children under the age of 5 years.

Can cold weather be a cardiovascular determinant in warm countries?

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In almost every temperate region of the world, the number of cardiovascular mortality increases significantly during winter months. This phenomenon has been considered as a public health issue in several countries as many of these deaths are considered to be avoidable. The cause for the excess of winter deaths can be attributed to a number of factors, such as diet, exercise and exposure to cold weather. Curiously, southern European countries, such as Portugal, seem to have the highest excess winter deaths that seem to be related to exposure of cold.

However, very few studies have addressed this relationship in Portugal and no quantification of the role of cold weather on cardiovascular diseases has been published.
The main goal of this study is to quantify the short effect of cold weather on the cardiovascular morbidity in Portugal

Generalized additive Poisson regression models were used in order to obtain the influence of a thermal comfort index (PET) on daily hospitalizations for acute myocardial Infarction in the two most developed metropolitan areas of Portugal: Lisbon and Oporto.

All models were adjusted for time and other environmental variables. Influenza was also considered as a confounder.

The main results reveal an increase up to 2.2% (95% CI = 0,9%; 3,3%) of daily hospital admissions in winter per degree fall in PET. The increase in daily hospitalizations was greater for the entire population than when only the elderly (>65 years) were considered.

Public Health

Exposure to lead and risk factors for cardiovascular dideases: a methodological proposal

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Environmental exposure to lead, even in low concentrations, is considered a public health issue, due to its ability to accumulate in the organism for a long period of time, and also to the absence of a safe concentration in the exposure to this metal. Cardiovascular diseases represent the main cause of death in the world. Studies have shown that exposure to low concentrations of lead might contribute to worsening these diseases. The objective of the current study is to present a methodological proposal to evaluate the relationship between the blood lead levels and the risk factors for cardiovascular diseases in the general population. It is a cross-sectional study conducted in the city of Cambé, in the state of Paraná, Southern Brazil, with a total of 92,888 inhabitants. The study population was composed by urban residents, aged 40 or more, and a total of 33.1% of the population of that city was in this age group. The size of the sample was calculated using the program Epi Info 3.5.1, considering an expected ratio of 50%, error margin of 3% and confidence interval of 95% resulting in a sample of 1,066 subjects interviewed. Contiguous households were visited in a randomly traced trajectory, and in each domicile, a draw was made to select one dweller with more than 40 years old, until reaching the quota of people to be interviewed, according to gender and age group in each censor sector. The dependent variable was the blood lead level and the independent variables were: demographic and social-economical variables, variables related to health conditions, arterial blood pressure, body mass index, lipid fraction (total cholesterol, triglycerides, HDL), kidney disease, vascular accident, smoking habit, alcohol consumption. All subjects presenting occupational exposure to lead were excluded. The determination of lead in blood shall be performed by Inductively Coupled Plasma Mass Spectrometry Technique (ICP-MS). For the statistical analysis, the Chi-square test will be used, together with variance analysis, with significance level of 5%. The present study intends to contribute to the discussion on the influence of exposure to low levels of lead in the risk factors to cardiovascular diseases.

Public Health

Impact of extremely low frequency electromagnetic field on *Drosophila subobscura* development

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During the last decade there has been increasing public concern on potential health risks from modern, man-made electromagnetic fields. Extremely low frequencies (ELF) fields from electrical and electronic appliances and power lines are present in everyday life. Electromagnetic fields represent one of the most common and fastest growing environmental factors, with exposure levels continuing to increase as technology advances. Studies show that exposure to electromagnetic fields even a few times higher than the Earth's or with extremely low frequencies, may cause stress in different organisms.

Electromagnetic field (EMF) used in this experiment is in the range that people worldwide are commonly exposed to in homes and at work (0.25 mT and frequency of 50Hz). Drosophila is one of the most studied model organism widely used for the investigation of many developmental and cellular processes common to higher eukaryotes, including humans. In our research we have analyzed ELF EMF impact on development through fitness components during three generations on population genetics model organism – Drosophila subobscura. Females from different isofemale lines laid eggs in the presence or absence of EMF for 24 h period. Eggs were continued to maintain in the same conditions (presence or absence of EMF) for the next 24 h. After that, development of both group progeny was completed in absence of additional EMF. Therefore, the progeny was exposed to EMF in embrional and early postembrional stages of development.

Results show that exposure of developing larvae to ELF electromagnetic fields significantly modified development time. Development time, relevant to whole development and fitness of organisms, was significantly shortened ($p < 0.001$) in the presence of ELF EMF. Effects observed for the other measured fitness components — egg-to-adult viability and fecundity do not show significant differences. Three-way ANOVA analysis show significant differences on development time and egg-to-adult viability in interaction treatment × isofemale line. This significance indicates a genetically based trait of sensitivity to weak ELF fields and importance of genotype × environment (G × E) interaction.

Public Health

Changes in fitness components during three generations suggest that exposure to ELF magnetic fields at mT levels may disturb embrional development. However, additional studies are needed to reveal subtle effects and possible health impacts of the weak ELF fields on development of organisms.

Emerging Issues in Environmental Health in Portugal: AP Tox Survey Results

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In the last decade environment and health regulation in Europe have advanced significantly. Consequently, environmental health professionals have had to adapt to increasing multi-disciplinary knowledge demands. This rapid change in the profile of an environmental health professional puts significant demands on the training and research requirements in the field.

In order to understand the impact that such changes are having in environmental health (EH) in Portugal, AP Tox developed a survey on "Emerging Issues in Environmental Health in Portugal" that could be completed online during the 25th Oct 2010 – 31st Jan 2011. The objective was to identify current and future key EH problems in Portugal and to assess additional training and research needs. The survey consisted of 10 short questions that could be completed in less than 10 minutes.

The total number of respondents was 95. These were predominantly (83%) professionals working in EH in Portugal. Most worked within the academic (22%) and government (23%) sectors. Respondents generally (62%) felt that current EH regulations in Portugal contribute positively to personal health. An overwhelming number of respondents (86%) indicated that toxicology is very important in linking environmental exposures to health effects.

Chemical hazards were identified as the principle hazard contributing to most (70%) EH problems in PT with exposures from occupational settings and chemicals in foods posing most concerns. Current health endpoints most affected due to EH exposures in PT are: respiratory, neoplasmas, and skin disorders. Respondents also indicated that for the next 5-10 years, the exposures of concern will mostly likely be associated with airborne chemical hazards. Health endpoints of concern during this period are most likely to be from respiratory and neoplastic disorders.

In terms of training and research in EH, respondents identified the most relevant training required for EH professionals to be in the areas of environmental health, toxicology and epidemiology. It is interesting to note that 60% felt that continuous education in EH topics to be very important and should become obligatory for EH professional to remain in their jobs. Only 39% of respondents are involved in EH research. This research is mostly (94%) nationally funded with FCT (82%) and FGC (29%) being the main funding sources.

Health Impacts of Urban Vegetation used for Climate Change Mitigation Measures

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Climate change is potentially the largest global threat to human health ever encountered.

Research on how society can respond to climate change, either in the form of mitigation or adaptation measures, is now urgent. It is however important to ensure that response actions done for one sector (i.e. energy or agriculture) in society do not cause adverse impacts in another (i.e. water resources or public health). Ideally, win-win situations should be priorities where co-benefits across sectors are possible and adverse impacts do not increase. At the international level, very few studies have assessed the health impacts associated with climate change mitigation options.

In the past three years, several Portuguese municipalities made public their plans for climate change mitigation. In urban regions these always include landscape and building changes to allow for additional vegetation. Vegetation proposed are typically plants that can tolerate heat and water stress such as olive trees. In addition technological changes such as green roofing are also common. Although these mitigation options are all welcomed, the impact that these could have on human health have not been assessed or even suggested.

Public Health

In this study we assessed over 200 trees and shrubs that can be used in climate change mitigation projects to determine their potential impact on urban population health.

The assessment focused on:

- The suitability of the plant to tolerate extreme climate variability.
- The suitability of the plant for the city/urban environment
- The oral and dermal toxicity potential of the plant
- The allergic potential of the plant

We identified 20 trees and 21 shrubs that pose negligible public health risks and are suitable for use under extreme climate variability conditions which are likely to become more frequent in Portugal. We also identified trees and shrubs that should be avoided in urban environments due to their negative impact on human health

Fungal contamination of poultries litter: A public health problem

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Although much research has been done on microbial contaminants associated with the various stages of processing poultry and meat products, only few investigations have reported on litter fungal contamination.

The goal of this study was to recognize eventual occupational exposure of poultries workers to fungi and their metabolites, but also to evaluate the extent of diffusion of keratinophilic fungi in poultries and agriculture fields.

Used and new litter samples from seven poultries were collected. Considering samples analysis, each litter sample (10 g – not oven-dried prior to processing, retaining thus it's natural water content), was diluted in 100 mL of sterilized distilled water, agitated for 30 min at 100 rpm and 0.2 mL of this suspension was spread, in triplicate, onto Petri dishes containing Mycobiotic agar for dermatophytes (up to 3 weeks incubation at 27.5 ºC) and malt extract agar (2%) with cloramphenicol (0.05 g/L) for non-dermatophyte fungi (5–7 days at 27.5 ºC of incubation). Fungal identification was carried out by macroscopic and microscopic (using lactophenol blue staining) observation of colonies for filamentous fungi, using identification atlas. Results were reported as the average count of the three replicas, in colony forming unit per gram of litter (cfu/g) and also with identification of the isolated fungal species.

Twelve different fungal species were detected in new litter, in a total of 805500 isolates, from the analyzed poultries. *Penicillium* was the most frequent genus found (59.9%), followed by *Alternaria* (17.8%), *Cladosporium* (7.1%) and *Aspergillus* (5.7%). *Aspergillus fumigatus* was the most frequent species found (32.6%) from *Aspergillus* genus.
Regarding used litter, nineteen different fungal species were detected, in a total of 2276500 isolates. *Penicillium* sp. was the most isolated (42.3%) followed by *Scopulariopsis* genus (38.3%). From *Aspergillus* genus (5.53%), *Aspergillus versicolor* was the most frequent (73.4%).

Besides the occupational problem that may be associated with fungal contamination of poultry litter, the reused of this material as a fertilizer in the agriculture may provide several public health and/or environmental problems.

Water quality in old uranium mining regions and public health

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Uranium mining and milling generated a large amount of radioactive wastes including acid and radioactive mine waters and waste waters that may contaminate surface and groundwater resources. The Centre-North of Portugal host most of this mining industry oriented to the production of radium and uranium that left a legacy with a noticeable current environmental impact still. Water from the main rivers and artificial lakes in the region, such as those in the catchment of River Mondego, were monitored for determination of radionuclides in water and sediments. Furthermore, water from wells near old uranium mines and tap water from villages and towns in the region were monitored for radioactivity. Activity concentrations of the main radionuclides in water are presented and, in general, levels were below the maximum recommended limits. Surface waters, particularly the streams receiving leakage from mine waste deposits or discharges of untreated acid and radioactive mine waters, generally displayed higher radioactivity levels. The main water reservoirs, such as the Aguieira artificial lake displayed background radioactivity levels. Some surface aquifers near old uranium mines display higher radionuclide concentrations and their use as drinking water should be avoided. In a few cases, water contamination by radionuclides from uranium ore could represent a potential exposure to consumers and a public health risk. Such cases are presented and the overall radiological risk to public health in the region is discussed.

Public Health

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