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10th Iberian and 7th Iberoamerican Congress
on Environmental Contamination and Toxicology

CICTA 2015

Abstract Book

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Endocrine Disruption	89	Risk Assessment	115
Effects of the endocrine disruptor vinclozolin in the benthic organism <i>Chironomus riparius</i> (Diptera).	89	Wastewater reuse: a study of chloroform formation	115
Developmental effects of a xenoestrogen and an aromatase-inhibitor in zebrafish (<i>Danio rerio</i>) embryogenesis	91	Carbon capture and storage (ccs) strategy: a risk assessment overview focused on marine bacteria	117
Differences in the xenoestrogenic sensitivity of five teleost species exposed to 17 α -ethinylestradiol	93	Maturity and stability parameters in the quality assessment of composts, sludges and other representative organic wastes intended to agricultural use	119
Gonadal development and biological recovery of zebrafish exposed to 17 β -estradiol (e2) and 17 α -ethinylestradiol (ee2)	95	Testing potential CO ₂ leakages on three marine microalgae: metal speciation and biological effects	121
Evaluation of zebrafish gonad development after endocrine disruptors' exposures	97	Rational design for safer nanomaterials: a case study with nano-biosurfactants.	123
Biomarkers	99	Determination of estuarine vulnerability to contamination for use in ecological risk assessment	125
Ecotoxicological and biochemical effects of an herbicide and a metal on zooplankton and phytoplankton estuarine and marine species	99	Phosphorus fractionation in sediments from a small-sized dam in a rural mountainous catchment: case study in NE Portugal	127
The influence of different microalgae diets on cell and tissue level biomarkers in mussel digestive gland	101	Environment risk assessment and bioaccumulation of metals in the metal contaminated basin	129
Accumulation kinetics of copper and silver and assessment of the effects exerted after dietary exposure in oysters <i>Crassostrea gigas</i>	103	Global Changes	131
Sub-lethal effects of exposure to atrazine in gill cells of sea lamprey downstream migrants	105	An ecological relevant approach to oil sands	131
Identification of molecular biomarkers of exposure to sanitary sewage in oyster <i>Crassostrea brasiliana</i>	107	Bioremediation	133
Biomarkers, histopathology and condition indices in sole (<i>Solea senegalensis</i>) exposed to contaminated sediment	109	Synergistic and beneficial effects of 2,4-epibrassinolide and progesterone for the environmental remediation of progesterone by <i>Solanum nigrum</i> L. Plants	133
Is there endocrine disruption in male mugilids from the Tagus Estuary?	111	Effect of aluminum on ros content and antioxidant system in rye (<i>Secale cereale</i> L.) leaves and roots	135
Background concentrations of polycyclic aromatic hydrocarbons metabolites in Portuguese firemen	113	Bioremediation of different types of oil in estuarine and coastal environments – the role of autochthonous microorganisms	137

(WWTP) in the vicinity of the estuary, which are removing the suspended particulate matter (SPM) in the wastepipes, thus lessening (at least) the input/exposure by ingestion. More studies are warranted, with more sensitive biomarkers (like hepatic expression of vitellogenin), to definitely answer the question at stake.

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Biomarkers

Background concentrations of polycyclic aromatic hydrocarbons metabolites in Portuguese firemen

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Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous environmental pollutants produced by the incomplete combustion of organic materials. PAHs may pose risks to human health as many of the individual compounds are cytotoxic and mutagenic to both lower and higher organisms, being some of them regarded as carcinogenic. Pyrene is by far the most characterized PAH in all sample matrices, and is classified as PAH marker of exposure while benzo(a)pyrene is considered the biomarker of carcinogenic exposure to PAHs. Among the 16 PAHs established by US EPA as priority pollutants, naphthalene, acenaphthene, fluorene, and phenanthrene are also found in almost all the matrices.

Workers from industrial settings where airborne PAH levels are high such as coke works and the primary aluminium industry, show excess rates of cancers. Firemen are also exposed to high concentrations of PAHs during firefighting; however their biomonitoring is difficult and epidemiological studies are scarce. During the last decade, the urinary 1-hydroxypyrene has been used as a biomarker of environmental and occupational exposure to PAHs. Still no standard reference or occupational guidelines are available for any urinary PAH metabolite.

Within the present work, sixty healthy and no smoking Portuguese firemen from ten Portuguese corporations from the district of Bragança (North of Portugal) were evaluated regarding their levels of the most important urinary hydroxyl-PAHs: 1-hydroxynaphthalene, 1-hydroxyacenaphthene, 2-hydroxyfluorene,

1-hydroxyphenanthrene, 1-hydroxypyrene and 3-hydroxybenzo(a)pyrene. Firemen were asked to fill a structured questionnaire to characterize the group and to identify the potential exposure routes to PAHs. Hydroxyl-PAH concentrations were normalized with the respective urinary creatinine levels.

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Risk Assessment

Wastewater reuse: a study of chloroform formation

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Wastewater reuse has been considered an appropriate and alternative water source, e.g., for green areas irrigation. For safety reasons, recycled waters should be chlorinated, to maintain a residual protection against microbiological regrowth. However this disinfection procedure can lead to secondary reactions and subsequent formation of halogenated compounds, such as trihalomethanes, that include chloroform (CHCl_3), a substance that presents a significant risk to or via the aquatic environment, and named as a priority substance according to the European Water Framework Directive.

Although the chloroform formation has been widely studied, the majority of experiments have been carried out on natural organic matter (NOM) from surface waters and less attention has been paid to wastewaters. When municipal wastewaters are stored in landscape ponds (e.g., in golf courses), NOM from two distinct water sources is present. Since the aromatic content of NOM depends on the type of source, the disinfection by-products (DBP) formation is expected to follow a different pattern.

The chloroform concentration and its correlation with chlorine dose and reaction time in synthetic wastewaters for reclamation purposes were studied in this work. Experiments were carried out in batch mode with a simulated wastewater for green areas irrigation. A two variant empirical model is proposed to simulate breakpoint chlorination practices, when chlorine dose is equal or lower than chlorine demand, and super chlorination techniques, when chlorine dose tends to surpass chlorine