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(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 warrant, 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 (CHCl₃), 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...