



Book of Abstracts

26th International Symposium on Polycyclic Aromatic Compounds ISPAC 2019

9-12 September 2019 | Örebro University
Musikhögskolan, Concert Hall
Bilbergska huset, Lecture Hall B



PAHs and Microplastics

Microplastics, polycyclic aromatic hydrocarbons (PAH) and biofilms in freshwater

Luisa Jordao^{1*}, Silvia Jose¹

¹Environmental Health Department, National Institute of Health Dr Ricardo Jorge, Portugal

*maria.jordao@insa.min-saude.pt

Water pollution resulting from domestic and industrial use of non-biodegradable materials such as plastics is a major source of water pollution and concern. In the present work, we investigated the ability of five different plastics to adsorb PAHs in freshwater bodies and functioning as surfaces for biofilm assembly.

The ability of five currently used plastics, polyethylene terephthalate (PET), high density polyethylene (HDPE), low density polyethylene (LDPE), polypropylene (PP) and polystyrene (PS) to adsorb benzo(a)-pyrene (BaP), a group 1 carcinogenic compound, pyrene (Pyr) a less toxic compound that we detected in different water samples in a previous study was evaluated by HPLC-FLD. The same method was used to assess the concentration of BaP and Pyr in solution. After 3 days BaP was preferentially adsorbed by all plastics being PP and PS the most and less efficient in PAH adsorption, respectively. Pyr adsorption followed the same trend but without significant differences. After 30 days, the differential adsorption of BaP and Pyr by different plastics vanished being the higher recovering rates observed for HDPE.

In parallel, the ability of bacterial species isolated from freshwater responsible for infections in humans (*E.coli*, *K. pneumoniae* and *Aeromonas sobria*) to assemble biofilms on plastics was evaluated by scanning electron microscopy (SEM) and viable colony forming units (CFU) were evaluated by plating on selective media after 1 and 3 months. Biofilm assembly increased with time. LDPE followed by HDPE and PS were the best surface for biofilm assembly, curiously these plastics were the ones for which more surface irregularities were detected at all time points (0, 1 and 3 months). For PET and PP biofilms and bacteria were detected only after 3 months in small plastic fragments. The presence of Pyr, BaP or mixture of Pyr:BaP (1:1) significantly inhibit planktonic bacteria proliferation. The effect of PAHs on biofilms differs with bacterial species and exposure time.

The present results show that plastics can adsorb PAH present in water and function as surfaces for biofilm assembly by different human pathogens. The impact of PAH adsorbed in plastics on bacterial biofilm assembly is a work on progress, as well as, the toxicity effects on human cells.