Are microplastics facilitating the accumulation of organic pollutants in benthic bivalves?

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Microplastics are potential vehicles of other contaminants in the marine environment to food chains . For this reason it is important to understand both the impact of microplatics alone as well as from those with adsorbed chemicals in marine organisms. In this sense the work presented here investigates the effects of microplastics in the benthic marine bivalve Scro- bicularia plana after 14 days exposure to 1 mg L-1 to polysterene (PS; 20 im spheres), and of low-density polyethylene (LDPE) of different size ranges (4-6, 11-13 and 20-25im particles) with and without adsorbed persistent organic contaminants: benzo-a-pyrene (BaP), perfluorooc- tane sulfonic acid (PFOS) and benzophenone-3 (BP3). Clams were sampled at the beginning of the experiment (day 0) and after 3, 7, and 14 days of exposure. A multibiomarkers ap- proach was used to investigate the effect of exposure in different clam tissues, gills, digestive gland, and haemolymph. Antioxidant (superoxide dismutase, catalase, glutathione peroxidase) and biotransformation (glutathione-S-transferases) enzyme activities, oxidative damage (lipid peroxidation levels), genotoxicity (single and double strand DNA breaks), and neurotoxicity (acetylcholinesterase activity) were assessed. PS accumulated in tissues and induced genotoxi- city with time. BaP adsorbed in LPDE was accumulated in clam tissues. Oxidative stress was noted in gills for all LDPE+adsorbed chemicals. An increase of biotransformation enzymatic activity was noted in gill tissues for all MP treatments over time. Neurotoxicity effects were ob- served after exposure to LDPE+BaP and LDPE+BP3. Oxidative damage was also observed in all LDPE+adsorbed contaminants. Some evidence suggests that LDPE+BP3 and LDPE+BaP induces genotoxicity over time. Overall results showed a tissue-specific biomarkers response with gills being more affected by exposure to microplastics than digestive gland and biomarkers alterations apparently more related to the toxicity of adsorbed chemicals than to microplastics alone.

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