
Toxicity of environmental and polystyrene plastic particles on the bivalve *Corbicula fluminea*: focus on the molecular responses

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Abstract

In aquatic environments, microplastics (MPs) and nanoplastics (NPs) represent a major ecological threat. To date, a large number of ecotoxicological studies has focused on the impacts of MPs and NPs on marine organisms compared to freshwater ones. In addition, most current laboratory studies use standard MPs and NPs whose characteristics (shape, composition, surface charge, adsorbed contaminants) are far from being representative of those found in the environment. The present study aims to study the molecular responses of the freshwater bivalve *Corbicula fluminea* exposed to both standard NPs composed of polystyrene (PS NPs) and MPs and NPs generated from macro-sized plastic debris collected in the environment (ENV MPs and NPs). Bivalves are relevant study models because they are particularly exposed to MPs and NPs due to their high filtration rate and unselective feeding strategy. The organisms were exposed to the different types of plastic particles at three environmental concentrations: 0.008; 10 and 100 $\mu\text{g.L}^{-1}$. Gene expression measurements were performed in the gills and the visceral mass at 7 and 21 days to assess the effects of plastic particles on different functions related to the stress response. The results demonstrate major differences between the PS NPs and ENV MPs and NPs, especially in the oxidative stress, immunity, apoptosis and neurotoxicity functions. This study highlights the necessity to use plastic particles derived from debris collected in the environment compared to manufactured ones in the laboratory for a realistic assessment of environmental risk.

Keywords: microplastics, nanoplastics, bivalve, *Corbicula fluminea*, environmental plastics

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