Investigating primary producers buffer effect against mercury pollution in two marine invertebrate species

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Human activities have significantly deteriorated marine environments with contaminants. Oxygen release by photosynthetic organisms might enhance marine animals' aerobic performance in challenging conditions, such as ocean warming. However, our understanding of its buffering effects against pollution is limited. This pilot study explores the potential of oxygen supersaturation to mitigate mercury pollution, simulating primary productivity. Experiments were conducted on two commercially relevant species, such as the sea urchin *Paracentrotus lividus* and the clam *Ruditapes philippinarum*. Adults of both species were collected from the Venice lagoon and then exposed to the combination of 2 levels of oxygen saturation (90% as control, 160% representing daily supersaturation) and 2 concentrations of mercury (0 and 1 µg/L, as mercury chloride) for 7 days. At the end of the exposure, different biomarkers, indicative of oxidative stress and immunosurveillance, and mercury bioaccumulation were evaluated in both species, while physiological and behavioral traits were assessed for *P. lividus* only. Results indicated differences in the responses of the two species to mercury under hyperoxic conditions, highlighting that animals' reactions to environmental factors are often species-specific. Notably, mercury bioaccumulation was lower in clams under hyperoxic conditions than those in normoxic once. In sea urchins, females exhibited higher mercury levels in their gonads than males. Lastly, no significant effects have been detected on sea urchins' physiological and behavioral traits. The study is part of the RETURN Extended Partnership, funded by the European Union Next-Generation EU (National Recovery and Resilience Plan – NRRP, Mission 4, Component 2, Investment 1.3 – D.D. 1243 2/8/2022, PE0000005).

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