Long-Term Ecotoxicological Effects and Bioaccumulation of UV-filter Benzophenone-3 on the Marine Invertebrate, *Crepidula onyx*

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Abstract

Chronic exposure to benzophenone-3 (BP-3), a widely used UV filter, poses a significant threat to marine ecosystems. To date, no complete lifecycle toxicological investigation of BP-3 exposure has been documented in aquatic invertebrates. This study examined the complete life cycle impacts of environmentally relevant concentrations of BP-3 on a marine invertebrate *Crepidula onyx,* including transgenerational consequences. BP-3 exposure led to an alteration of shell characteristics and sex-specific weight change. Furthermore, chronic exposure significantly caused gonad structural abnormalities. delayed sexual maturity and spawning, reduced offspring output, and impeded embryonic development of the next generation were also observed. Transcriptomic analysis of F1 gastrulae from exposed parents showed significant alterations in gene expression, particularly in pathways related to nucleic acid metabolism. Results revealed dose-dependent bioaccumulation and maternal transfer of BP-3 and its BP-type metabolites, BP-1 and BP-8. Recovery was observed in the F1 generation after BP-3 withdrawal highlighted management strategies for BP-3 in marine environments.