A Direct Comparison of the Acute Toxicity of Zinc Oxide Nanoparticles and Avobenzone to Daphnia magna

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Sunscreen active ingredients are a key factor of maintaining good health due to their protection from harmful radiation from the sun. However, these ingredients often pollute waterways and have a negative effect on aquatic ecosystems because they are toxic to invertebrates. The freshwater invertebrate Daphnia magna serves as an important indicator of the harm on an ecosystem that these ingredients cause. The toxicity of the chemical sunscreen avobenzone has been studied, but there is little data on the toxicity of zinc oxide nanoparticle mineral sunscreen to Daphnia magna and no direct comparison of the two UVA filters. An acute toxicity study of the two sunscreen ingredients to Daphnia magna was conducted, to determine if the toxicity of zinc oxide nanoparticles less than that of avobenzone. Young Daphnia magna were placed in beakers containing dilutions of zinc oxide nanoparticles and avobenzone in spring water. The number of dead Daphnia magna was counted every 24 hours for a total of 48 hours. Both chemicals had a toxic effect. As the concentration of the toxicants rose, the Daphnia magna treated with avobenzone had up to 15% more mortalities than the group treated with zinc oxide nanoparticles and the control group after 48 hours. This implies that zinc oxide nanoparticle sunscreen has less negative impact on freshwater ecosystems at similar concentrations to avobenzone. Further research is needed to study the effects of chronic exposure and physiological changes in Daphnia magna caused by sunscreen ingredient pollution.

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