"Reef Safe" Sunscreen: The Impact of Zinc Oxide Particle Size on Chlorophyll A and B in Zooxanthellae

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How would the introduction of Zinc Oxide (ZnO) particles, in a mineral-based sunscreen, or as nanoparticles which are found in chemical sunscreens and cosmetics, negatively affect the growth of zooxanthellae measured by chlorophyll A and B density, measured spectrophotometrically (430 and 453 nm, respectively)? To simulate the conditions of Oregon's coastal water, the nanoparticle ZnO and mineral ZnO were diluted down to 1 ug/L in seawater. I cultured the zooxanthellae for 10 days and then extracted samples for chlorophyll analysis, ten for each treatment group and ten for the control. The zooxanthellae's relative health was measured using extracted chlorophyll measured at 430nm and 453nm using a UV-Visspectrophotometer to account for chlorophyll A and B. Although the nanoparticle and mineral groups showed minor differences when compared against each other, the treatment groups collectively showed significantly lower absorbance than the control group. When run through an ANOVA test, the p-value at 430 nm was 0.048 and the p-value at 453 nm was 0.056. This shows statistically lower growth of zooxanthellae after introducing ZnO. Therefore zooxanthellae succeed better in an environment without excess ZnO from human interaction. While mineral sunscreen may be a better alternative to chemical sunscreens, it is not a solution without impacts. Regarding Oregon coastal areas, sea anemones in active human areas may display negative reactions, even if the sunscreen has met “reef-safe” regulations.

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