The Hidden Cost of Sun Protection: A Comparative Analysis of the Bleaching Impact in Acropora Corals Exposed to Chemical and Mineral (Nano and Non-Nano) UV Filters

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Although Corals offer us plenty of services, they are constantly threatened by chemicals in the sunscreen that can induce coral bleaching. Approximately 14,000 tons of sunscreen enter the ocean annually. This study investigates and compares the effects of chemical and mineral sunscreens on coral health. Acropora cervicornis coral fragments were acclimated and introduced into four test beakers with artificial sea water. Beaker 4 served as control with no sunscreen exposure. To replicate swimmer associated pollution, varying concentrations (2g, 5g, 10g) of sunscreens were released into a separate vessel through manual immersion and the resulting solution was then introduced to the coral beakers. Over a 96-hour period, coral health was monitored by assessing Polyp retraction, Tissue loss and Bleaching codes. The experiment was repeated for 12 trials and the results were averaged. Significant shifts in water pH and turbidity were recorded to assess coral health. Results showed that chemical sunscreens were not concentration-dependent and caused the corals to bleach from E6 to E1 on the Coral Watch Chart. However, the mineral sunscreens containing Nano and Non-Nano ZnO were concentration-dependent and caused the corals to bleach from E6 to E2. Hydrogen peroxide tests in Mineral sunscreen beakers showed that the ZnO also caused Oxidative Stress, inducing bleaching. Results proved that using Non-nano ZnO is not a complete solution, as the mineral sunscreens can be equally harmful as chemical sunscreens and the term Reef Safe on label does not guarantee coral safety. As a solution, I would like to enhance this project by applying a Probiotic treatment using Okra mucilage as a biodegradable carrier to investigate if this can increase survival of corals from sunscreen pollution.

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