Indomethacin and Prednisone Protect Symbiodinium Clades B and D Cell Growth during Heat Stress, Year III

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Coral reefs and many marine cnidarians are hosts to symbiotic, nutrient-providing dinoflagellates (unicellular protozoa) in the genus Symbiodinium. Corals rely on this symbiont for growth and development, and a bleaching event (the loss of these algal symbionts) can be fatal. Bleaching can occur for a variety of reasons, including high solar irradiation, changes in temperature, and disease. Many of this changes are associated with climate change. Differences in thermal and stress tolerances among Symbiodinium clades result in preferential uptake of a particular clade following bleaching events. The exact mechanisms of this selection are unknown, but heat stress and light stress bleaching occur due to different pathways. The purpose of this research was to determine whether treatment with indomethacin or prednisone may be related to the heat stress pathways that control bleaching or apoptosis, such as the unfolded protein response (UPR). Here, indomethacin and prednisone were used to study the subtle differences between clades B and D of Symbiodinium and how they may react differently to stress events. Indomethacin has been shown to affect cnidarian reproduction positively and functions by inhibiting the production of hormones that cause inflammation in humans. Prednisone is an immunosuppressant and anti-inflammatory medication. Algal cells were cultured in vitro with and without low concentrations of indomethacin or prednisone. This novel research indicates that cells exposed to indomethacin or prednisone were protected against heat stress more than controls. Quantitative analysis determined that cell densities with and without indomethacin and prednisone varied to a statistically-significant degree.

Awards Won: