The Administration of Ascorbic Acid Through Infused Hydrogel Patches To Benefit Dugesia tigrina With Oxidative DNA Damage Repair

Hughes, Rachel (School: Rockledge High School)

Damage to DNA can have serious health repercussions, like cancer and neurodegenerative disorders. However, antioxidants like ascorbic acid (also known as vitamin C) have shown to have positive effects on oxidative DNA damage, which is induced by reactive oxygen species. The way ascorbic acid is administered may impact its efficacy in repairing damaged DNA and preventing further damage. This approach tests the efficacy of different administrations of ascorbic acid and how they affect oxidative DNA damage, specifically investigating if a hydrogel infused with ascorbic acid could be a better tool for repairing DNA damage. I demonstrated this idea using Dugesia tigrina exposed to UVA radiation, an external form of reactive oxygen species, as a model due to their accelerated rate of cell regeneration. After exposing the Dugesia tigrina to UVA radiation, I separated them into Groups A, B, and C. Group A was the control group of Dugesia tigrina, which was not exposed to any ascorbic acid. I synthesized the ascorbic acid-infused hydrogel and administered it to Group C, then exposed Group B to a 2% ascorbic acid solution. Group B did not yield any conclusive data. I performed protein electrophoresis on the specimens. The molecular weight of the DNA was greater ($p < 0.01$), and the rate of protein migration was lesser ($p = 0.05$) in Group C than Group A. I can confidently conclude that this indicates that the ascorbic acid-infused hydrogel is an effective way to repair DNA damage in Dugesia tigrina. Hydrogels infused with ascorbic acid have promise in biomedical applications.

Awards Won: