The Development of an Innovative Systemic Catalytic Mechanism for the Removal of Free Radicals Associated with Colorectal Cancer

Henderson, Jaxon (School: Cascia Hall Preparatory School)
Pool, Jackson (School: Cascia Hall Preparatory School)
Uhren, Zachary (School: Cascia Hall Preparatory School)

In recent years, rates of colorectal cancer among young people have seen a shocking increase. Hydrogen peroxide is known to be a leading cause of cancer throughout the digestive tract. The buildup of hydrogen peroxide and other free radicals in the large intestine are the key factors in the increase in colorectal cancer rates. The hydrogen peroxide build-up in the colon creates adenomatous polyps that can become cancerous tumors. Hydrogen peroxide can be catalyzed by an enzyme found in the body called catalase. This project attempted to find a catalyst that would break down hydrogen peroxide in a safer, more efficient way. The catalysts tested in this project are iron(III) chloride, potassium iodide, manganese dioxide, and catalase. Some catalysts would be dangerous in our bodies due to their exothermic nature. The project develops a system to deliver the catalyst to the colon is a safe manner. A serial dilution of hydrogen peroxide was performed to test the catalysts at a concentration closely resembling the digestive tract. The dialysis tubing test was performed to observe the hydrogen peroxide transfusing through the membrane of the tube to suggest that the catalyst would still catalyze without being released into the surrounding environment. This experiment exhibited the catalyzing qualities of Catalase, MnO_2, $FeCl_3$, and KI. MnO_2 was found to be the most viable catalyst to be utilized within the human body to help aid in the removal of free radicals. These results were suggested to be significant by the fact that the ANOVA test p-value was less than .000001.

Awards Won:

Arizona State University: Arizona State University Intel ISEF Scholarship
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