

**RILEY HIGDON**

STUDENT, BIOLOGICAL AND  
ENVIRONMENTAL SCIENCES

**DEVIN HUGHES**

LAB MANAGER, BIOLOGICAL AND  
ENVIRONMENTAL SCIENCES

**EMILY POLLOCK**

LAB TECHNICIAN, BIOLOGICAL AND  
ENVIRONMENTAL SCIENCES

## **THE EFFECT OF ASCORBIC ACID ON THE EFFICIENCY OF PACLITAXEL IN MDA- MB-231 CELLS**

Paclitaxel is a chemotherapeutic drug that has shown promise in the killing of cancer cells in the body. By targeting the membranes of cancer cells, paclitaxel induces apoptotic activity in the cancer cells, ultimately leading to their death. Ascorbic acid, or vitamin C, is an antioxidant that has also shown promise in its anti-cancer characteristics. However, ascorbic acid has also been shown to increase the efficiency of paclitaxel. Paclitaxel, while being very efficient in inducing apoptosis, also has toxic side effects linked to prolonged use and use with high concentrations. I used concentrations of ascorbic acid beginning at 0 and increasing by 25 $\mu$ M up to 100 $\mu$ M, as well as concentrations of paclitaxel beginning at 0 and increasing by .25 $\mu$ M up to 1 $\mu$ M to observe the rates of apoptosis and cell death in different treatments. Initial treatments were paclitaxel and ascorbic acid individually, and further treatments were combinations of the two to observe how the efficiency of paclitaxel was affected. It was found that the ascorbic acid increased the

efficiency of the paclitaxel in nearly every group, with the highest level of apoptotic activity being in the treatment group with 100 $\mu$ M ascorbic acid and 1 $\mu$ M paclitaxel. Overall, it is visible that the combination of the treatments yielded higher levels of apoptotic activity than in the treatments of paclitaxel alone at the same concentrations. With the understanding that the addition of ascorbic acid increased the efficiency and levels of apoptotic activity in the paclitaxel treatments, the next step in research would be to refine the treatment method and understand the mechanism of action between the two substances. While it was found that the ascorbic acid has a positive effect on the paclitaxel, it is not possible to distinguish whether it was the presence of the ascorbic acid and its anti-cancer properties that increased the efficiency or if its addition had a direct effect on the paclitaxel's mechanism.

***Research Advisor: Dr. Glynis Price***