Cytotoxic Effects of Sulindac, Metformin, and TBHP on in vitro Lung Cancer Cells and the Effects of Glucose Level on Efficiency of the Treatment

Reddy, Shreya (School: Lincoln Park Academy)

Lung cancer is the second most common cancer and accounts for 1 in 4 cancer deaths. Sulindac is an FDA approved anti-inflammatory drug. Metformin is an anti-diabetes drug which is also FDA approved. Tert-butyl hydroperoxide (TBHP) is a drug that causes oxidative stress in cells. Patients using Sulindac and Metformin had lower incidents of cancer, so this study tests the synergistic cytotoxic effects of all three drugs on the A549 lung cancer cell line. Typically, a high glucose medium is used on in vitro cancer cells because they thrive in such an environment. These media have almost five times the amount of glucose that is present in the human body. A medium with realistic levels of glucose was used alongside the high glucose medium to determine if there were any differences in the efficiency of the drug treatments. Each trial consisted of a well plate grown in a high glucose medium and a well plate grown in a low glucose medium. 15 wells were untreated as the control, 15 wells were treated with 500M Sulindac, 15 wells were treated with 2mM Metformin, and 15 wells were treated with both 500m Sulindac and 2mM Metformin. The cells were then treated with five concentrations of TBHP. Cell viability was measured using an MTS Cell Proliferation Assay to determine cytotoxicity. The results indicated that the combination of Sulindac, Metformin, and TBHP caused significantly more cytotoxic effects than the individual treatments. Also, a lower level of glucose improved the efficiency of the drug in comparison to a higher level of glucose. These results can be implemented to create an innovative lung cancer treatment using a combination of drugs which are already FDA approved and inexpensive. This study also makes known that a low glucose environment improves drug efficiency.

Awards Won:
Samvid Education Foundation: Agni Third Award