A Natural Way to Improve Chemotherapy: Investigating the Effect of Biochanin A on the Efficacy of Thapsigargin in a C. elegans Cancer Model

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Multidrug resistance is a major obstacle in the treatment of cancer. One of the major causes of resistance is P-glycoprotein, an ATP binding cassette transporter that binds and removes toxins from cells, enabling cells to eliminate drugs and toxins before damage is incurred. This study aimed to test the effect of a potent P-glycoprotein inhibitor, Biochanin A, on the efficacy of an anticancer drug called Thapsigargin. Interestingly, it has been found that Biochanin A is able to specifically target cells that overexpress P-glycoprotein, enabling it to increase the accumulation of chemotherapeutic drugs in cancer cells without causing further harm to healthy cells. The nematode Caenorhabditis elegans has been used as an alternative cancer model for certain drugs such as Thapsigargin because it possesses a homolog for a calcium ion transporter that is targeted by Thapsigargin. In this study, C. elegans was used to model cancerous tumors and were treated with Thapsigargin either alone or in combination with Biochanin A. It was found that treating worms with Biochanin A in conjunction with Thapsigargin produced significantly greater reductions in population than Thapsigargin alone, indicating that Biochanin A may be able to improve the effectiveness of chemotherapy and prevent or reverse drug resistance. Additional trials are being conducted to confirm these findings.

Awards Won:

Third Award of $1,000