Mitigating the Harmful Effects of Radiation Therapy With the Synergistic Effects of Curcumin Bioavailability and Piperine on Dugesia dorotocephala

Tharani, Aliza (School: Colleyville Heritage High School)

Cancer radiotherapy weakens surrounding benign cells whilst eradicating a malignant tumor. These consequences are indicative of a general decline in cellular vitality within the organism. Employing an approach utilizing a stem cell tissue model of Dugesia dorotocephala’s neoblast cells to investigate the therapeutic properties of the hydrophobic compound curcumin, the combination of it and the potent antioxidant piperine, which acts as a bioavailability enhancer, facilitated the uptake of curcumin by the cells. This strategy was found to effectively scavenge free radicals, preventing and mitigating the harmful effects of radiation therapy. The planaria were irradiated after topical application of a constant amount of curcumin, and varying amounts of piperine to determine the optimal concentration needed to enhance the bioavailability of the cells. With respect to the growth percent change of a planarian under the influence of radiation and treatment, ANOVA and t-tests solidified the outcome of the ideal quantity of 20 mg of piperine in conjunction with 15 mg of curcumin, with a p-value of <0.002 against an alpha of 0.05. The optimal treatment was then further tested under different radiation exposure times, yielding consistent and correlated evidence of the novel therapeutic treatment's efficacy.

Awards Won:

University of Texas at Arlington College of Science: Scholarship of $10,000