Determining If Phenethyl Isothiocyanate (PEITC) Is an Effective Tumor Suppressant in Yki-S168A Drosophila melanogaster Mutants

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Cruciferous vegetables, commonly consumed vegetables, contain a cancer fighting compound, phenethyl isothiocyanate (PEITC). PEITC has been found to inhibit cell proliferation and induce apoptosis. Drosophila melanogaster possesses Yki, a validated functionally conserved ortholog of YAP, the human gene. When crossed with a GAL4, mutant Yki-S168A is overexpressed in the fly eye, producing tumors. This study determined whether PEITC suppressed tumors in Yki-S168A mutants. A dose response study was conducted that exposed Yki-S168A Drosophila melanogaster mutants to 0, 0.05, 0.1, 0.25, 0.5 mM concentrations of PEITC. ImageJ was used to measure the fly eye area and a metric was created to compare eye phenotypes. A one-way ANOVA revealed a significant difference in relative eye area between experimental groups compared to the Wild Type, especially in females ($F(6, 30)=[1.225]$), $p<0.0001$), and no significant difference between any experimental groups raised on PEITC ($p>.05$). Additionally, fly eyes in the experimental groups, regardless of concentration, exhibited the most severe phenotype. Two potential reasons could be that PEITC did not reach the tumor site in vivo, or that the tumor suppressor WTp53 in the nucleus was not able to suppress overactive Yki. A recent study found that when p53 is mutated, the gene is not functional and can not interfere with PEITC targeting the YAP oncogene in human cancer lines. Tumor suppression was not effective in Yki-S186A mutants, indicating the use of mtp53 may be needed to reduce the ophthalmic tumors.

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