

Near Infrared Light Photobiomodulation and *C. longa* Mitigates the Neurological Effects of Mutant Amyloid Beta Precursor Protein Pathway in *D. melanogaster*

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Alzheimer's Disease affects an estimated 5.4 million people, making it the sixth leading cause of death in the United States. Seeking to increase therapeutic gains, near infrared light (NIR) and Curcuma longa, two forms of treatment previously found to be efficacious when applied on their own, were combined in this study. Two *Drosophila melanogaster* mutants, one with a ds-RNA tau protein mutation (181) and another with a human tau gene mutation (28891) were exposed to treatment of NIR in combination with a diet consisting of Curcuma longa. Effects of this combined treatment on the symptoms in the tau mutated *Drosophila melanogaster* sample were investigated over the course of two, five-day-long data collection periods, repeated over six trials, with NIR exposure lasting one hour per-day and Curcuma longa continuously implemented in the diet. The flight patterns and behaviors of the tau mutated *Drosophila melanogaster* samples treated with the proposed combined treatment were recorded and compared to tau mutated and control wild types samples treated with either NIR or Curcuma longa alone using CTRAX. The symptomatology was measured through the variables of mean speed, displacement, and angular velocity. Using t-tests to compare the difference in means between the groups, results showed a statistically significant ($p < 0.05$) decrease in symptoms using the proposed combined treatment compared to utilizing the treatments individually in the mutated sample groups. The evidence presents a significant link to the decrease in symptoms due to the multiplicity of cellular mechanisms that both NIR and Curcuma longa interfere with in the normal pathology of Alzheimer's.

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