The Effect of Intermittent Metabolic Switching (IMS) on the Cognitive and Behavioral Abilities of Mutant Drosophila, Leading to Brief Synaptic Neuroplasticity as an Alzheimer's Model

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The goal of this experiment was to determine the effect of the Intermediate Metabolic Switching (IMS) diet on the short and long-term memory of mutant Drosophila due to neuroplasticity. There have been past links between IMS and neuroplasticity. Neuroplasticity modifies neuronal functions and creates new neural networks and can be measured in ketone count. The IMS diet includes two components: fasting and a low-carbohydrate, high-fat diet. The Phenol-Sulfuric Acid Assay and the Hanus Iodine Solution Assay were both used to quantify the two diets of the flies, a 2:2 ratio carbs to fats, and the other a 4:1 fats to carbs ratio. It was hypothesized that if fruit flies are fed the IMS diet, leading to synaptic plasticity, then their overall memory and behavioral health will increase because of the amount of ketones released, increasing memory formation. Mutant Drosophila tested, which lacked the Amyloid-Precursor Protein-like gene (APPL), exhibited similarities to early-stage Alzheimer's patients. Assays include the Aversive Phototaxis Suppression Assay, used to measure short term memory; the Aversive Pavlovian Olfactory Assay was used to measure long-term memory; the Drosophila Activity Monitor software system, used to track movement of Drosophila; the Drosophila Stress Odorant (dSO) Assay, used to measure behavioral mood changes in the flies, and the ß-Hydroxybutyrate Ketone Quantification assay, to measure ketone levels and ensure the IMS diet is working efficiently. Results from these assays were all conclusive, establishing that the flies in the 4:1 diet were more sensitive but retained short and long term memory, overall establishing the use of IMS as a preventative mechanism for Alzheimer’s.

Awards Won:
First Award of $5,000