The Effect of Copper (II) Sulfate Pentahydrate Concentration on Locomotor Ability and Lifespan of Transgenic Alzheimer's Model Drosophila melanogaster

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Alzheimer’s Disease (AD) is a progressive neurodegenerative disease believed to be caused by the abnormal breakdown of proteins creating toxic Aβ plaques. Copper is naturally occurring in the brain and is required for maintaining the health of neurons. Two conflicting theories on copper interaction with AD exist: 1. Aβ plaques absorb Cu2+ ions, creating a Cu2+ deficiency in neurons, decreasing neuronal function 2. Excess Cu2+ in the brain binds to Aβ, increasing aggregation, causing an increase in neurodegeneration. This study researched the effects of Cu2+ concentration on transgenic Drosophila melanogaster using a GAL4-UAS system expressing the human “Arctic” Aβ42 mutation to determine if supplementation could decrease AD-associated effects. A dose-response study was conducted by adding 0, 1, 10, 100, 500, and 1000 μ□ concentrations of CuSO4.5H2O to Instant Drosophila Medium Blue. AD has progressive deterioration of movement coordination over time so a negative geotaxis assay was conducted on days 7, 8, and 9 of life to measure neurological function. Probability of survival was documented using Kaplan-Meier curves. Results showed that as Cu2+ concentration increased, locomotor ability of Arctic flies increased significantly ($p<.05$), while that of wildtype and Gal4 controls generally decreased. Arctic flies had normalization of lifespan with no significant difference in lifespan existing between 10 μ□ Arctic and 0 μ□ wildtype flies ($p>.05$). These results imply that Cu2+ supplementation had an ameliorative effect on neurological function and lifespan of transgenic Drosophila melanogaster suggesting that Cu2+ supplementation may have an improving effect in AD patients.