Magnesium Magic: The Rescue of the Parkinson's Model of Drosophila melanogaster With MgCl2 Supplementation

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Parkinson's disease (PD), the second most common and fastest-growing neurodegenerative disorder affecting over 10 million people worldwide, is characterized by progressive neurodegeneration and movement disorders. The underlying cause of PD is a decrease in dopaminergic neurons. Magnesium deficiency may also be a major contributor of dopaminergic neurodegeneration by perturbing cerebral blood flow and causing oxidative stress, neuroinflammation, and mitochondrial dysfunction. Currently, there is no established preventive treatment for PD. Nevertheless, the chemical magnesium chloride may have preventive effects, exhibiting neuroprotective mechanisms. I hypothesized that MgCl2-supplementation could target PD pathophysiology. Specifically, I investigated whether a long-term MgCl2-supplemented diet could enhance neuromuscular fitness and survival in a Drosophila melanogaster model of PD. After determining the dosage of MgCl2 (0.03%) through acute-dose toxicity and CAFE assays, male wildtype or PD model Drosophila were raised on a 0.03% MgCl2-supplemented or control diet. Neuromuscular fitness and survival were monitored over 70 days. The results demonstrated a significant improvement in neuromuscular fitness as early as day 7 and a significant increase in lifespan among both wildtype and PD model flies fed a MgCl2-supplemented diet. This suggests that MgCl2 may serve as a preventive treatment for neurological aging and PD. Further research in higher organisms is needed to establish the potential benefits of long-term MgCl2-supplementation, particularly for individuals with a high-risk or familial history of neurodegenerative diseases.

Awards Won: