A Novel Approach to Treating Parkinson's Disease With Amino Acids to Alleviate LRRK2 Gene Mutation Symptoms in C. elegans Evaluated via the Use of Multidimensional Analysis Methods

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Parkinson’s disease is a neurological disorder that impacts the movement control of patients due to the degeneration of neurons, reducing the dopaminergic levels in the brain. This causes symptoms associated with impaired mobility. Another neurological disease is schizophrenia, which is associated with abnormal alterations to serotonin and dopamine levels, leading to cognitive disabilities. Although schizophrenia is currently incurable, amino acids, such as sarcosine and tryptophan, in the form of nutritional supplements are prevalently used to stimulate the release of vital neurotransmitters, thus improving both the cognition and gait movement of patients. While the two diseases differ, the overlapping symptoms between Parkinson’s and Schizophrenia has raised the question of whether or not the treatment of one disease can be impactful for a second disease. An in-vivo experimentation was conducted that investigated the use of Schizophrenic antipsychotic supplements for Parkinson’s treatment. The experiment involved testing a range of concentrations of sarcosine, tryptophan, and a combination of the two on three strains of C. elegans being wildtype and LRRK2 mutated worms. To determine the treatment’s effectiveness, differential equations that measured the angular acceleration, velocity, and vector direction of the C. elegans were utilized. By developing a software that skeletonized binary images to analyze the C. elegans’ kinematics, the findings suggested that though all three supplements were effective, the 0.5 M concentration of the combination was the most promising approach over a 72-hour period due to diminished bradykinesia, faster angular velocities/accelerations, and increased synaptic activity in the LRRK2 mutated C. elegans.

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