Novel Geotaxic Data Show Botanical Therapeutics Slow Parkinson’s Disease in A53T and ParkinKO Models

Biswas, Kristi (School: Paxon School for Advanced Studies)

Parkinson’s disease (PD) is a movement disorder with classical motor impairments in PD patients including akinesia, resting tremor, and muscle rigidity. The pathological hallmark of PD is the progressive and selective loss of dopaminergic neurons in the Substantia nigra pars compacta, which decreases dopamine, caused by a-Synuclein aggregates. Efficacy of botanical remedies Baicalein and Puerarin root extract were evaluated on two PD Drosophila melanogaster A53T and ParkinKO models, by using a novel geotaxic algorithm, designed to track motoric dysfunction. All cultures without botanical remedies were used as control set of organisms. Three different doses of Baicalein and Puerarin were added with media as the independent variables for all cultures. A Haar-like cascade model using OpenCV framework and java program was developed to detect movement as low as 100 microns, enabling determination of location tracking, speed, distance travelled, tremor, and stoppage counts. A total of 441 videos (240 fps) were analyzed for speed, distance travelled, movement linearity, and stoppage counts. Both remedies slowed PD progression in both PD models but no significant impact on wild-type. Tukey tests revealed both Puerarin and Baicalein significantly improved the average speed and distance travelled (p-value < 0.05, 0.005, and 0.001) in both PD models. Both PD model control sets had highest tremors and higher stoppage counts that demonstrated motor dysfunction. Both PD models experimental sets had reduced tremor and stoppage counts in a dose-dependent manner. This study showed that Baicalein and Puerarin can be cheaper and less-aggressive alternatives to slow PD progression and the novel geotaxic algorithm can successfully be used to track motoric dysfunction in fruit fly PD models.

Awards Won:
Third Award of $1,000