# Drosophila Dopaminergic Neuron Location Importance

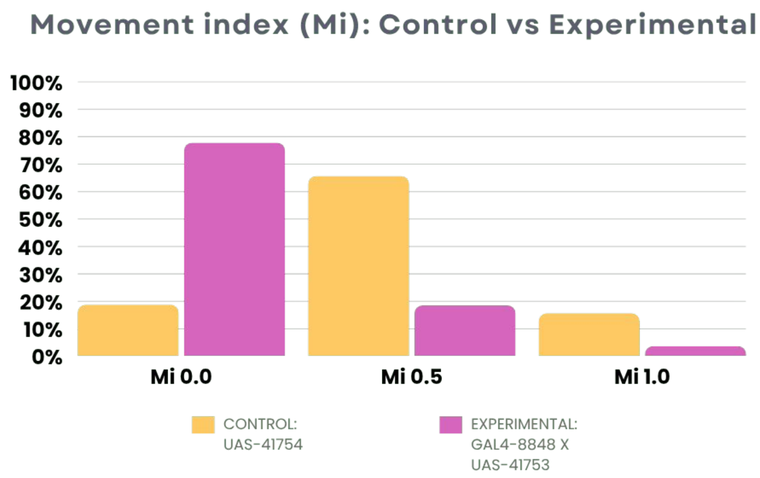
**Sung Ha Yoo [1,2], Lauren Callum [2], Egbefe Omonzane [2], Dr. Kyle Gobrogge [2]**

Arete International Scholars, Incheon, South Korea [1] , Boston University Department of Neuroscience, Boston, MA, 02215 [2]

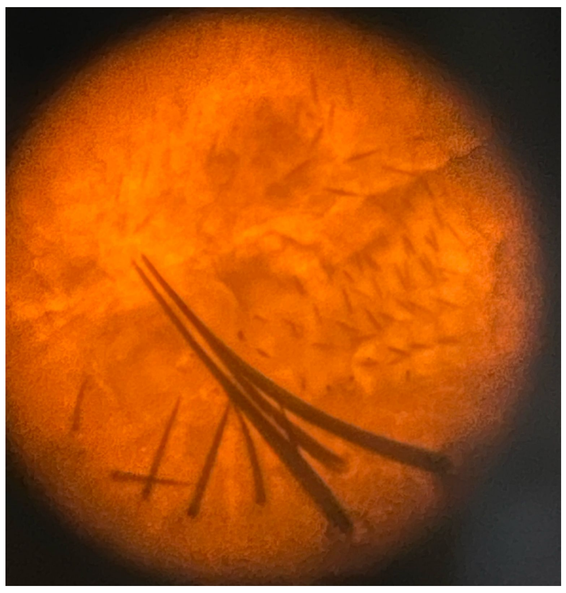
## Introduction

**Parkinson's Disease is a neurodegenerative, motor-dysfunctional disorder caused by degeneration of dopaminergic neurons and the consequent deficiency of the neurotransmitter dopamine. Various studies have utilized the GAL4/UAS system for Drosophila Melanogaster to reveal behavioral patternology. However, this research takes a different approach and models two trans-genetic crosses that will help visualize the degree of dopaminergic neuron importance among the brain areas besides the Substantia Nigra: the UAS Visualization line for MCherry (UAS-25774) with GAL4-8848 and the UAS Manipulation for Halorhodopsin Chloride Channel (UAS-41753) with GAL4-8848. To differentiate even further, this study will specifically observe climbing assay in Drosophila Melanogaster. The hypothesis is that the Protocerebrum part of the Drosophila Melanogaster brain will be noted as one of the most important parts of the Drosophila brain. Based on this discovery, the goal is to connect it to the human anatomy: the human equivalent of the Protocerebrum is considered the Clarke's column in the spinal cord. If the hypothesis is supported, this study will serve as a gateway to the reality that parts of the brain besides the substantia nigra play a large role in Parkinson's, and that they should not be neglected.**

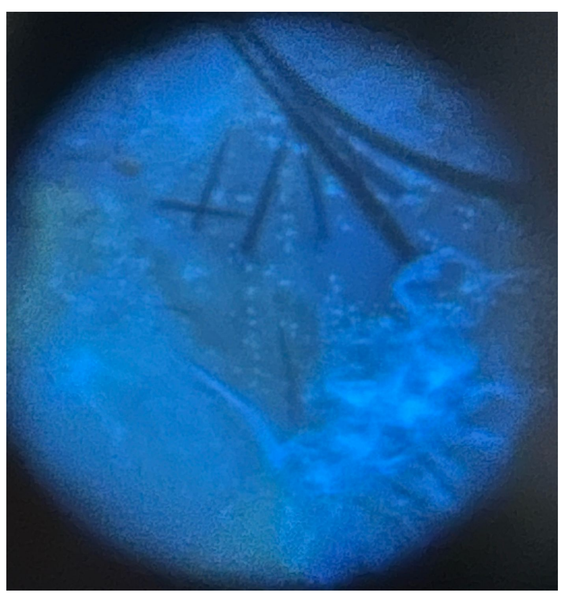
## Results




Movement index represents the degree to which the respective fly groups moved. Mi 0.0 represents the proportion of flies that did not climb the cylinder at all; Mi 0.5 represents the proportion of flies that moved enough to be considered a fly that climbed a statistically significant amount; and Mi 1.0 represents the proportion of flies that moved to the very top of the cylinder



Red fly brain imaging represents MCherry activation

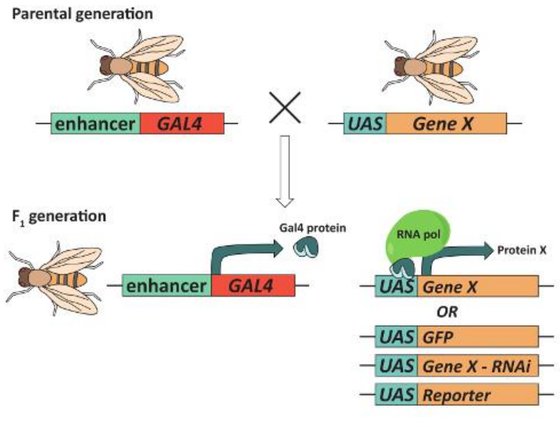


Blue fly brain imaging represents DAPI staining: 4',6-diamidino-2-phenylindole

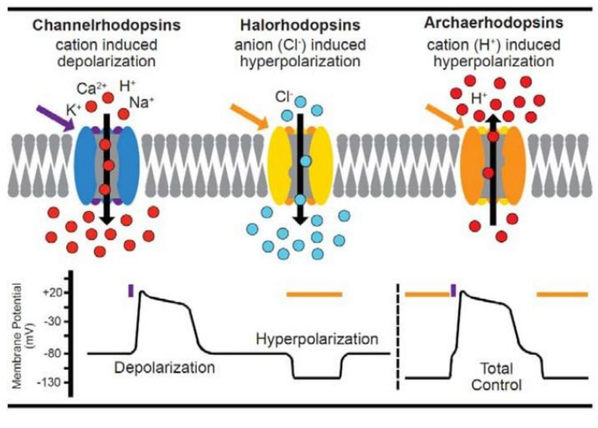
## Discussion/ Conclusions

- **Drosophila Melanogaster models that cross the GAL4-8848 line and UAS-41753 line face impeded mobility based on lower mobility index score relative to the GAL-8848 line that was not crossed with UAS-41753.**
- **Research confirmed the relevance of Halorhodopsin chloride channel in inactivating dopamine based on the climbing assay test.**
- **Visualization color difference after Drosophila Melanogaster dissection signified proper crossing between GAL4-8848 and UAS-25774.**
- **Visualization did not signify any specific area that had more dopamine concentration related to Parkinson's, but data proved that degree of importance varies depending on the brain region through thicker dye expression in regions.**

## Methods




**GAL4/UAS System is used to create transgenic Drosophila Melanogaster models**




**Halorhodopsin chloride channel is used to inactivate the dopamine**

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