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A Drosophila Model to Examine Collective Migration during Retinogenesis

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Abstract
Retinal dysfunction is often caused by aberrant neural cell migration during development. In this study, we observed the migration of neural cells of the Drosophila melanogaster after marking cells of the 3rd instar larva with the GAL4-UAS expression system when exposed to a concentration gradient of FGF-8 through the use of a microfluidic device. The glial and neuronal cell ratio in the developing brain was determined through immunofluorescent staining and observation. In future studies, a microfluidic device that mimics the developing Drosophila brain and retina will be designed in order to better understand the biological factors that affect the migration and differentiation of the cells.

Introduction
In Drosophila melanogaster, the development of the retina occurs when populations of neural progenitor cells differentiate into photoreceptors and cells. Neural and glial precursors migrate collectively, a mechanism that remains incompletely understood. [1] Fibroblast growth factor (FGF) has been shown to be a major component in cell fate specification and migration in the developing retina of vertebrates. [2] Previous work from our group has shown that Drosophila glial and neuronal cell clusters in a microfluidic system exhibited increased motility with an increase in FGF concentration. [3] Investigation of the cooperative mechanisms and associated signaling molecules behind glial and neuronal movement would allow for better understanding of the underlying factors behind neuronal migration disorders.

Materials and Methods

Drosophila Stock, Dissection/Dissociation
Drosophila stocks were kept on standard cornmeal agar at 25°C under light microscope at 16X magnification. (B) Third instar larvae were dissected and the brain complexes were obtained. Fifteen larvae were dissected and the brain complexes were obtained. (D) Immunostaining has shown that in our sample of third instar larvae brains the optic stalk in order to evaluate collective migration after genetic modification. (C) Glial to Neuron Cell Ratio

Results
GFP+ Glial Cells in Obtained Brains Complexes and Dissociated Cell Culture

Cell Migration Observed in Microfluidic Device

Discussion

Future Direction

Acknowledgements

References