Presenter: Gustave Li, Stathopoulos lab

Poster title: Investigating the Cell-Autonomous Role of Pyramus in *Drosophila* Optic Lobe T4/T5 Neuronal Development

Abstract: Fibroblast Growth Factors (FGFs) are evolutionarily conserved signaling proteins that play critical roles in development and tissue organization. In *Drosophila,* the FGF8-like ligand Pyramus (Pyr) is a Type I transmembrane protein that possesses an extended extracellular domain (ECD) outside of its core FGF domain as well as an intracellular domain (ICD). While its non-cell-autonomous role as a ligand for the Heartless (Htl) FGF receptor has been well characterized, the regulation and function of its unique ICD is largely unknown. We hypothesize that Pyr extracellular domain containing the FGF-homologous portion signals in a non-autonomous manner, whereas the intracellular domain supports a cell-autonomous role. To examine Pyr's atypical cell-autonomous role, we searched for expression that may support Htl-independent actions. Through transcriptomics analysis, confirmed by immunostaining, we found that Pyr is expressed in T4 neurons of the developing optic lobe. Notably, despite sharing the same developmental origin and trajectory, the closely related T5 neurons do not express Pyr, making the T4/T5 neuronal pair a unique model for studying Pyr reverse signaling in neural development. We developed a GAL4-based method to monitor Pyr cleavage *in vivo* and detected that the Pyr ICD is released from the transmembrane domain in a subpopulation of T4 neurons. Furthermore, gain-of-function experiments at the third instar larval (L3) stage lead to significant optic lobe overgrowth. In later stages (pupal stage P48), Pyr overexpression produces a neuronal bundling defect in which T4/T5 neurons fail to synapse at the correct neuropil layer. Together, these findings suggest a pleiotropic cell-autonomous role of Pyr in regulating T4/T5 neurogenesis in early developmental stages, and axon pathfinding and/or synaptogenesis in later stages. We are currently following up these leads as well as assaying whether Htl-expressing astrocyte glia in the optic lobe support Pyr's function in this context.