Stony Brook University
The Graduate School

Doctoral Defense Announcement

Abstract

Canonical Wnt Signaling and Sox2 Maintain the Neuromesodermal Progenitor Population in the Zebrafish Tailbud

By

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The development of the vertebrate body relies on a precise coordination of morphogenesis and cell fate decisions. Each developmental process involves a wide array of signaling factors and pathways to interact in sync to result in a properly formed adult body. One such process is axis elongation during posterior growth. During posterior growth, the body elongates posteriorly from a structure called the tailbud. The vertebrate tailbud contains a population of neuromesodermal progenitors (NMPs) that give rise to the posterior spinal cord and somites. Tailbud NMPs undergo a precise two-step epithelial to mesenchymal transition (EMT), which requires canonical Wnt signaling (Wnt) for NMPs to become mesodermal progenitors and exit the tailbud. However, tailbud NMPs lack both a known single marker of the NMP state and a mechanism of how Wnt is able to control both fate and coordinated movement of NMPs. Here we present a model where the function of Wnt in NMPs is dependent on *sox2*. NMPs that receive both a Wnt signal and *sox2* are held in a bipotential state. When NMPs continue to express Wnt and lose *sox2*, they are able to complete EMT and exit the tailbud to join the presomitic mesoderm. Moreover, we found that NMPs can be identified by cadherin 6 expression, a gene that we have also found to be most highly expressed in the presence of both Wnt and *sox2*. The NMP state therefore is an important developmental stage where major differences in cell fate, motility, and gene transcription are determined by the presence and interaction of Wnt and *sox2*.

Date: November 29, 2018
Time: 10:00 AM
Place: Laufer Center Room 101

Program: Genetics
Dissertation Advisor: Dr. Benjamin Martin