

Neuroscience Seminar

Speaker

Dr. Dalit Sela-Donenfeld

The Koret School of Veterinary Medicine

The Robert H. Smith Faculty for Agriculture, Food and Environment,

The Hebrew University of Jerusalem,

Place: Annex building seminar room

Date/Time: Nov. 14, 2012, 14:00-15:30

Title and Summary

Deciphering axonal patterns, synaptic targets and molecular codes that govern circuit formation of hindbrain interneurons

Hindbrain dorsal interneurons (HdIs) constitute a main communication route between sensory and motor modalities in the nervous system. Yet, only little is known regarding circuit formation of HdIs. In this research, we characterized two populations of hindbrain dorsal interneurons, dA1 and dB1, that differ in their transcriptional codes, axonal projection patterns and target selection.

Novel genetic tools were utilized to label dA1 and dB1 neurons at early and late stages of chick embryos. Using dA1/dB1-specific enhancers, combined with Cre/Lox conditional expression cassettes and the PiggyBac-mediated DNA transposition system, the distinct axonal projections of dA1 and dB1 neurons were identified. Axons of dA1 neurons projected mainly contra-laterally and turned longitudinally at the lateral and dorsal funiculus, whereas axons of dB1 neurons extended at the ventral funiculus at the ipsi- and contra-lateral sides of the floor plate. The synaptic targets of dA1 and dB1 axons were followed and revealed that dB1 axons extended and formed synapses in the Purkinje layer of the cerebellum whereas dA1 axons targeted the EGL, IGL and Purkinje layers of the cerebellum, as well as the medullar cochlear nuclei.

Studying the mechanism that regulates the specific patterns of dA1/dB1 projections revealed a fundamental role of the Lim-homeodomain proteins. Alternating the code of dA1 Lim proteins (Lhx2/9) into dB1-Lim code (Lhx1/5), and vice versa, modified dA1/dB1 axonal patterns to project along the routes of the reciprocal subgroup, without affecting cell-fate acquisition. Together, this research provides new knowledge and tools to the assembly of trajectories, targets and connectivity of hindbrain dorsal interneurons as well as to molecular mechanisms that control these patterns.

Hosted by Fujio Murakami

All members of FBS are invited to participate in this seminar.