Cloutier Lab

Research Proposed:

The formation of accurate connections between neurons during development of the nervous system is dependent on several biological processes that include axonal outgrowth and guidance. The somatosensory system is required for the processing of stimuli, such as heat and surface pressure, which are detected by receptors on the skin. Primary sensory neurons that detect these stimuli and convey the information to the central nervous system are clustered in the dorsal root ganglia (DRG) located adjacent to the spinal cord (SC). While neurons with different sensory modalities are intermingled within the DRG, their central afferents segregate into specific laminae of the SC according to their sensory modality. Nociceptive and thermoceptive neurons project axons to the superficial layers of the SC (laminae I and II) while mechanoreceptive neurons project their axons to deeper layers (laminae III to VI). The elaboration of precise axonal projections is therefore critical to achieve an accurate representation of environmental stimuli in the central nervous system (CNS). While we have an excellent grasp of the anatomical characteristics of DRG afferent projections in the SC, the molecular mechanisms that promote accurate segregation of these projections remain poorly understood.

The proposed research project is aimed at examining the role of the axon guidance receptor, Neogenin, and of its ligands, the RGMs, in the development of the somatosensory system. During their stay in the laboratory, the student will determine the spatio-temporal expression patterns of RGMs and Neogenin in the somatosensory system using a combination of in situ hybridization and immunohistochemical approaches. In addition, the student will perform a detailed analysis of the accuracy of targeting of different subsets of DRG neuron axons in the spinal cord of Neogenin mutant mice. These studies will shed some light on the molecular mechanisms by which RGM-Neogenin interactions regulate the formation of accurate synaptic connections in the somatosensory system. Gaining a better insight into these mechanisms will be essential in the future development of regenerative therapies to repair damage caused to the CNS by injury.

Funding for proposed experiments is available but does not include stipend.

Contact:
Jean-François Cloutier
Montreal Neurological Institute
3801 University
Montreal, QC H3A 2B4

jf.cloutier@mcgill.ca

http://cloutierlab.mcgill.ca