LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER
SCHOOL OF MEDICINE

The Neuroscience Center of Excellence
Presents

Special Seminar in Neuroscience

"Semaphorins, neurotrophins, and Slits: Molecules that direct sensory axon elongation and arborization."

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8th Floor Lecture Room
Neuroscience Center of Excellence
2020 Gravier St., New Orleans, LA 70112

Axonal pathfinding, target selection, terminal arborization and formation of specific synapses within the targets are major steps in wiring of the nervous system. Newly differentiated axons grow unbranched and advance at a rapid rate towards specific targets. A variety of positive and negative molecular cues pave the way to appropriate targets. Once axons reach their targets, their growth slows down and they start forming terminal branches. We have been using the embryonic trigeminal pathway of rodents as a model system to study the role of a variety of target-derived molecular signals that guide differentiation of primary sensory neurons. During the establishment of this pathway a member of the semaphorin family of axon guidance molecules, Sema3 plays a major role in streamlining (by chemorepulsion) trigeminal axons to specific routes. NGF and related neurotrophins are also abundant in targets of trigeminal axons. These molecules serve multiple functions such as trophic support for trigeminal ganglion cells and tropic influences on their axons. In the presence of excess neurotrophins, trigeminal axons can overcome Sema3a-mediated repulsive axon guidance and invade foreign territories. For many axonal projections, molecular signals that govern branching and terminal arborization are largely unknown. Neurotrophin-3 and a member of the Slit proteins, Slit2 have potent arborization effects on embryonic trigeminal axons. Our studies reveal multiplicity of the molecular signals that shape development of trigeminal sensory axons, with implications for other developing pathways in the mammalian nervous system.