manitoba neuroscience network

Astrocyte diversity and brain circuit microenvironments

SEMINAR & VISITING SPEAKER SERIES

DATE

Monday, January 14, 2019 12:00 PM (Noon)

LOCATION

BMSB, Theatre C

SPEAKER

Dr. Keith Murai, Ph.D.

Director for the Centre for Research in Neuroscience
Professor, Neurology & Neurosurgery, Faculty and Department of Medicine
Research Institute of the McGill University Health Centre

BIO

Keith Murai is the Director of the Centre for Research in Neuroscience at McGill University, Leader of the Brain Repair and Integrative Neuroscience (BRaIN) Program at the Research Institute of the McGill University Health Centre, and Professor in the Dept. of Neurology and Neurosurgery at McGill University. He is a recipient of a Canada Research Chair position and is an EJLB Scholar for Schizophrenia Research. His research has two main areas of focus: (1) Understanding how neurons and glial cells cooperate to regulate brain development and homeostasis and (2) Discovering mechanism that regulate the plasticity of synapses that underlie memory formation, neurodevelopmental disorders, and neurodegenerative diseases. His laboratory uses advanced mouse genetic, imaging, electrophysiological, and optogenetic techniques and has pioneered approaches for understanding glial cells in brain function. He is an Associate (handling) Editor at Frontiers in Cellular Neuroscience, Section Editor in Development and Plasticity at the Journal of Experimental Neuroscience, and a Member of the editorial board at Developmental Neurobiology. He has been an author on high impact research studies published in journals such as the Journal of Neuroscience, PNAS, Journal of Cell Biology, Nature Neuroscience, Current Biology, Neuron, Cell, and Science.

Astrocytes are key partners for neurons in the healthy brain and contribute to the physiology and homeostasis of neural circuits. The complex molecular, functional, and structural properties of astrocytes enable these cells to precisely regulate extracellular ionic balance, neurotransmission, brain energetics, and cerebrovasculature. However, the mechanisms that enable astrocytes to perform highly diverse and specialized functions in the brain remain poorly understood. In this presentation, results will be provided showing the remarkable anatomical and functional complexity of astrocytes using advanced electron microscopy and molecular techniques. Furthermore, new findings will be shown demonstrating how mature neurons signal to neighbouring astrocytes to guide their molecular and physiological features in multiple brain regions. This neuron to astrocyte communication is both necessary and sufficient for astrocyte molecular diversification including the expression of important molecules including glutamate transporters and receptors, potassium channels, and water channels. Thus, ongoing communication between neurons and astrocytes plays an fundamental role in optimizing local neural circuit microenvironments to ensure optimal brain health and function.

OBJECTIVES

1. Discuss the complexity and heterogeneity of astrocyte populations in the CNS which may confer differential responses in the injured brain

2. Discuss the future potential of manipulating brain astrocytes for treating brain injuries, increasing resiliency of neurons in brain diseases, and promoting repair

For more information:

T: 204-235-3939
E: Networking@manitobaneuroscience.ca

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