manitoba neuroscience network

Uncovering the biological significance of adult neural stem cells using the zebrafish model

SEMINAR & VISITING SPEAKER SERIES

DATE

Friday, February 28, 2020
9:00AM

LOCATION

PX236/238 PsycHealth Building

SPEAKER

Dr. Benjamin Lindsey
PhD

Assistant Professor | University of Manitoba | Department of Human Anatomy and Cell Science

BIO

Dr. Lindsey completed his PhD at the University of Toronto where he developed methods to study adult neural stem cell plasticity in the zebrafish brain. He then completed his first postdoctoral fellowship at the Australian Regenerative Medicine Institute (ARMI) focusing on the potential of active and quiescent neural stem cell populations for brain regeneration. During his second postdoctoral position at the University of Ottawa, Brain and Mind Research Institute, he studied the cellular and molecular mechanisms regulating spinal cord regeneration. In February 2019, Dr. Lindsey joined the Department of Human Anatomy and Cell Science at the University of Manitoba as an Assistant Professor, where he has established the first Zebrafish Facility for neural stem cell research in the Rady Faculty of Health Sciences.

ABSTRACT

Adult neural stem cells (aNSCs) have the capacity to generate newborn neurons throughout life in restricted stem cell niches of the mature brain and spinal cord. This discovery nearly 30 years ago dramatically changed the way neuroscientists think about the CNS; from a collection of static structures, to one that is dynamically controlled by internal physiology and the external world. Neurogenic plasticity is a fundamental trait of aNSCs that leads to brain remodelling by changes in the size of the progenitor pool and resulting neuronal population in response to stimuli, learning, or injury. These findings have questioned how robust aNSC plasticity may be, and whether different aNSC populations are reserved for specific biological roles. Mammals and teleosts display a remarkable degree of heterogeneity amongst their aNSC populations, including populations residing in quiescent or actively dividing states. In mammals, including humans, aNSCs are highly responsive to intrinsic and environmental cues, but are unable to give rise to newborn neurons with injury. By contrast, aNSCs in zebrafish display the ability to undergo functional repair following either brain or spinal cord injury, making them an exceptional model to uncover the mechanisms regulating aNSC-driving neural regeneration. Presently, the cellular and molecular programs governing the activity of aNSCs in zebrafish stem cell niches over development, with social behaviour, and following neurotrauma are poorly understood. By exploiting the many attributes of the zebrafish model we will expand our understanding of vertebrate aNSCs and gain knowledge of the evolutionary significance of lifelong neural stem cell populations and new strategies to treat patients with neurotrauma.

OBJECTIVES

1 - Understand the features of the zebrafish model that make it optimal to study adult neural stem cell activity.

2 - Be aware of the various techniques that can be used to study adult neural stem cell function.

3 - Appreciate that different neural stem cell types have different regenerative capacities following CNS injury.

For more information:

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