manitoba neuroscience network

In Vivo Optical Dissection of Brain Capillary Function

SEMINAR & VISITING SPEAKER SERIES

DATE Thursday, January 16th, 2024

TIME 12:00 PM to 1:00 PM

LOCATION APOTEX 264

SPEAKER

Andy Shih, PhD

Professor, Department of Pediatrics and Bioengineering, Principal Investigator, Seattle Children's Research Institute for Developmental Biology and Regenerative Medicine.

BIO

Dr. Shih is a Professor in the Department of Pediatrics and an adjunct Professor in the Department of Bioengineering at the University of Washington. He serves as a Principal Investigator at both the Center for Developmental Biology and Regenerative Medicine (CDBRM) and the Norcliffe Foundation Center for Integrative Brain Research (NFCIBR). Dr. Shih earned his PhD in Neuroscience at the University of British Columbia under the mentorship of Dr. Timothy Murphy. His doctoral research centered on the role of Nrf2-mediated antioxidant defenses in neuroprotection after stroke and as a potential therapeutic target to enhance stroke recovery. Dr. Shih completed a postdoctoral fellowship at the University of California, San Diego, under Dr. David Kleinfeld, where he pioneered optical methods for visualizing and manipulating small vessels in the rodent brain using in vivo two-photon microscopy. Dr. Shih's research has been supported by the NIH and prominent organizations such as the American Heart Association, Alzheimer's Association, Dana Foundation, and New Vision Award. Many of his trainees have received prestigious fellowships and have gone on to successful careers in research and medicine.

ABSTRACT

My talk will delve into the mechanisms of cerebral blood flow regulation, with a particular emphasis on the brain's smallest vessels—the capillaries. I will highlight the critical importance of preclinical imaging approaches for studying capillary perfusion, as these structures are beyond the resolution of clinical imaging yet play a central role in many cerebrovascular disorders. Using in vivo two-photon imaging, I will present recent advances from optogenetic and chemogenetic experiments that selectively target pericytes—specialized cells that envelop brain capillaries—to uncover their roles in regulating blood flow. Finally, I will discuss how natural age-related changes in pericytes within the brain may contribute to cerebral white matter damage in chronic cerebrovascular conditions, including vascular cognitive impairment and Alzheimer's disease.

OBJECTIVES

- Microvascular architecture in the mouse and human cerebral cortex.
- The role of brain capillary pericytes in control of basal blood flow to the brain, and the development of new tools to visualize and manipulate pericytes in the living mouse brain.
- The consequence of abnormal pericyte function on vascular structure and perfusion.

For more information:

T: 204-235-3939

E: info@manitobaneuroscience.ca

Website: www.theshihlab.com

Hôpital St-Boniface Hospital RECHERCHE • RESEARCH

Division of Neurodegenerative Disorders

Health Sciences Centre Winnipeg

University of Manitoba