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SEMINAR FOR NEUROTRAUMA AND DISEASES

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PRESENTS

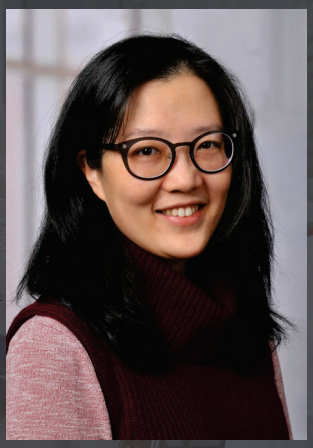
UNRAVELING THE CELLULAR AND MOLECULAR MECHANISMS CONTROLLING ACTIVITY-DEPENDENT MYELIN FORMATION AND RESTORATION IN THE CENTRAL NERVOUS SYSTEM

Date: October 25, 2023 **Time:** 4:00 p.m. - 5:00 p.m. EST

Location: DLR 131 **Zoom Link:** https://bit.ly/441DIlq

Meeting ID: 998 3163 3744 **Passcode:** CPR

FEATURED SPEAKER



WENJING SUN, PHD

Assistant Professor, Department of Neuroscience, Wexner Medical Center, The Ohio State University

Dr. Wenjing Sun is an Assistant Professor in the Department of Neuroscience at The Ohio State University. Her research interests focus on deciphering mechanisms controlling myelin formation and repair in the central nervous system. Dr. Sun's fascination with myelin biology was ignited during her graduate study at Purdue University, where she studied the strategies to restore axonal conduction along demyelinated axons after CNS trauma. During her postdoctoral training at the University of Bonn in Germany, Dr. Sun's research horizon was expanded to investigating the interaction between neurons and oligodendrocyte lineage cells, and she made important contribution to our understanding of how oligodendrocyte precursor cells integrate synaptic inputs from neurons.

Throughout her academic journey, Dr. Sun's dedication to this captivating field has taken her across borders. She has cultivated a multi-disciplinary research expertise where she combines a number of cutting-edge techniques. In her laboratory at OSU, her team utilizes in vivo gene delivery, opto- and chemogenetic techniques, together with multi-modal electrophysiology recording and advanced imaging approaches to investigate how neuronal activity regulate myelin development and adaptation during adulthood.

ABSTRACT

Most axons in the central nervous system (CNS) are wrapped with compact layers of myelin sheaths to ensure the rapid transmission of neuronal signals over long distances. As myelin thickness and sheath length profoundly affect conduction velocity, myelination is also crucial to precisely controlling spatiotemporal activity patterns in the CNS. Neuronal activity is known to positively regulate myelin development and induce adaptive myelin plasticity in adulthood, although the underlying mechanisms remain poorly understood. In the CNS, myelin sheaths are exclusively formed by oligodendrocytes, which are differentiated from oligodendrocyte precursor cells (OPCs). Neurons make bona fide synaptic contacts with OPCs in both grey and white matter, and OPCs lose those synaptic contacts once they differentiate into oligodendrocytes. These point-to-point synaptic contacts enable neuron-OPC communication with temporal and spatial precision, and genetically deleting or manipulating OPC-expressed neurotransmitter receptors negatively impacted the OPC proliferation, differentiation, and subsequent myelination. Therefore, it is believed that neuron-OPC synaptic transmission provides instructive cues for oligodendrocyte lineage cells, and is an important regulator for activity-dependent myelination. In this talk, I will discuss how OPCs integrate neuronal synaptic inputs. I will also discuss our unpublished data on identifying novel molecular mediators that promote myelin. Our findings provide new insights into the mechanisms underlying activity-dependent myelination and shed light on myelin repair after CNS trauma and diseases.

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