FUNCTIONAL MRI LABORATORY
UNIVERSITY OF MICHIGAN

Functional MRI Speaker Series

When: Tuesday, November 9, 2021 4:00 – 5:30 p.m.

Where: School of Education Building, Room 1202 – Schorling Auditorium
or via Zoom: https://umich.zoom.us/j/99085004689, passcode: 602054

Speaker: Jeffrey A. Stanley, Ph.D.

Professor of Psychiatry and Behavioral Neurosciences, Department of Psychiatry and Behavioral Neurosciences, Wayne State University

Presentation Title: **Functional Magnetic Resonance Spectroscopy: The "New" MRS for Cognitive Neuroscience and Psychiatry Research**

Specialization:

Jeffrey A. Stanley is a neuroimaging scientist with over 25 years of research experience in furthering the understanding of neural mechanisms underlying brain development and aging as well as different psychiatric disorders including schizophrenia, at risk populations for schizophrenia, ADHD, and mood disorders. Through the use of different innovative Magnetic Resonance Imaging (MRI) methodologies including Magnetic Resonance Spectroscopy (MRS), functional MRS, quantitative structural MRI and myelin water imaging, Dr. Stanley has made significant contributions from the perspective of brain chemistry, function, myelin microstructure and morphology to the field of Psychiatry.
His specialty is in: Assessing glutamate modulation related to task using functional ^{1}H MRS; Assessing the in vivo myelin microstructure of white matter tracts using myelin water imaging; Structural MR imaging using T_1 and T_2 mapping methods; In vivo ^{1}H and ^{31}P MRS; Brain development and aging.

ABSTRACT:

Proton magnetic resonance spectroscopy (^{1}H MRS) is a well-established technique for quantifying the brain biochemistry in vivo. In most studies, however, the ^{1}H MRS is acquired during rest with little to no constraint on behavior. Measured metabolite levels, therefore, reflect steady-state concentrations whose associations with behavior and cognition are unclear and limited. With recent advances in MR technology, ^{1}H MRS is now experiencing a resurgence with growing and compelling evidence of task-related changes in brain glutamate at temporal resolution similar to fMRI. More importantly, these changes are consistent with altered metabolic steady-states that reflect the neural output driven by shifts in the local excitatory and inhibitory (E/I) balance on local circuits. Unlike blood oxygen level differences-base fMRI, this form of *in vivo* MRS, also known as functional MRS (^{1}H fMRS), yields a more direct measure of behaviorally relevant neural activity and is considerably less sensitive to vascular changes. ^{1}H fMRS enables noninvasive investigations of task-related glutamate changes that are relevant to normal and impaired cognitive performance, and psychiatric disorders.

This presentation will: 1) introduce ^{1}H fMRS and its conceptual framework in assessing the neural output driven by shifts in the E/I balance on local circuits; 2) provide evidence that ^{1}H fMRS is a sensitive tool for detecting task-related changes in the excitatory neurotransmitter glutamate in functionally relevant brain areas; and 3) provide evidence on how ^{1}H fMRS can advance the understanding of neural dysfunctions related to the inability to shift the E/I equilibrium through mechanisms of impaired synaptic plasticity in aging and psychiatric disorders.