PAGE MORTON HUNTER DISTINGUISHED SEMINAR SERIES

MICRO-OPTICS AND BIOSENSORS TO STUDY BRAIN INJURY AND DISORDERS

Traumatic brain injury and stroke produce chronic inflammation that results in secondary brain damage which can lead to further neurological impairments. The inability of most drugs to cross the blood brain barrier (BBB) has led to a dearth of effective treatments to mitigate secondary injury. More effective medications are also needed for the third of epilepsy patients whose seizures are not controlled using currently available drugs. These situations have prompted Dr. Teresa Murray to create longitudinal methods to observe the effects of injury and of promising therapies using rodent models of these disorders. Dr. Murray will show how her lab developed high resolution micro-optics, multiphoton microscopy and 3D printing to create an in vivo imaging system to monitor the same brain cells over a few months. This powerful method spans a temporal range from milliseconds to months and spatial range from dendritic spines to local cellular networks. She will show how this system was employed to capture progressive secondary damage and recovery after drug administration. She will also reveal the results of studies using nanoscale drug carriers that cross the BBB. Additionally, she will show results from a novel neurochemical biosensor system that has enabled long-term recording of excitatory and inhibitory signaling in seizures and sleep.

Teresa Murray, Ph.D.

Academia, Rhodes Eminent Scholar Chair
Louisiana Tech University

Dr. Murray is the Rhodes Eminent Scholar Chair in Engineering at Louisiana Tech University (LTU). She is a BRAIN Initiative researcher and biomedical engineer conducting brain research using rodent models of disease and injury. She received her BS and PhD in Bioengineering at Arizona State University and was an NSF IGERT Fellow and NSF Graduate Research Fellow. As a postdoc at Yale, she pioneered the development of GRIN lenses for acute deep brain imaging in mice. At LTU, she created lens systems for longitudinal studies of traumatic brain injury and stroke and to evaluate therapeutic effects and nanoparticle delivery systems. She also codevelops neurochemical biosensors for longitudinal studies of the dynamics of excitatory and inhibitory signaling in epilepsy and sleep. She is experienced in electrophysiology, neurotransmitter dynamics, genetic engineering, and molecular biology. Her microscopy expertise includes FRET, TIRF, spectral confocal microscopy, and multiphoton imaging.

April 20, 2023 • 3:30 p.m.

Location:
108 Watt Auditorium

Department of
BIOENGINEERING
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