DEPARTMENT OF NEUROLOGY & REHABILITATION MEDICINE
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2026

PROJECT TITLE: Understanding Cerebral Pathophysiology in Relation to Traumatic Brain Injury

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Project Description

After a traumatic brain injury, secondary brain injuries develop that impact outcome including elevations in intracranial pressure, brain tissue hypoxia or ischemia, and seizures/spreading depolarizations. Patients with the most severe traumatic injuries undergo comprehensive, invasive monitoring with intracranial probes that directly measure the brain in order to detect and treat for these secondary brain injuries. However, understanding where these devices are measuring in relation to areas of injury is crucial to making clinical decisions and understanding where pathology is the most common. In this project, the student will learn to review brain CT scans and identify areas of focal traumatic injuries along with the location of intracranial monitoring devices. They will determine the extent of traumatic injury using standardized research scoring methods and quantify the distance that monitoring devices have been placed relative to areas of focal injury. Using this information, they will focus on the incidence of seizures and spreading depolarizations in relation to focal pathology. Our hypothesis is that seizures and spreading depolarizations occur proximal to a focal injury and that monitoring device placement should be optimized for the detection of these patterns to guide clinical detection and treatment.