CARNEGIE MELLON UNIVERSITY
BME 2021 SUMMER SEMINAR SERIES

Optical imaging of the healthy and diseased brain

PRESENTED BY

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SCHEDULE

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Bedside monitoring of tissue perfusion is important for a variety of diseases. For cerebral monitoring, cerebral perfusion is important especially for traumatic brain injury, hydrocephalus, sepsis, and stroke, where inadequate perfusion can lead to ischemia and neuronal damage. Diffuse optical methods, such as near-infrared spectroscopy and diffuse correlation spectroscopy, are non-invasive optical techniques which can be used to measure cerebral changes at the bedside. This talk will focus on these optical techniques as applied to clinical measurements to monitor patients and predict treatment outcome. One example of such will be presented which is our recent developments of a non-invasive intracranial pressure (ICP) sensor. For this we have developed an animal model of hydrocephalus, where ICP could be controlled and manipulated. Using diffuse correlation spectroscopy to measure cerebral microvascular blood flow, we developed an algorithm which translates cardiac pulses in blood flow into ICP. Our results show that ICP could be extracted to within ~4 mmHg, making this a clinically useful tool with the opportunity to replace invasive ICP sensors. This talk will summarize our optical imaging methods, experimental procedures, and results, as well as the path towards clinical translation.

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