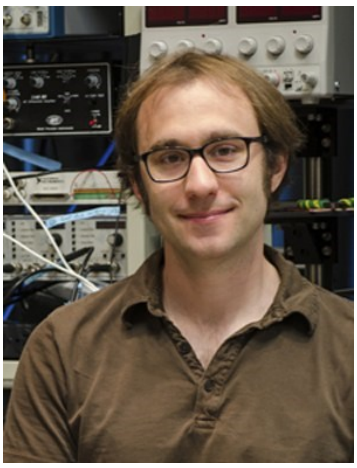
FIU Biomedical Engineering
FLORIDA INTERNATIONAL UNIVERSITY

Biomedical Engineering
Wallace H. Coulter Foundation
Lecture Series

WALLACE H. COULTER Foundation

"Cerebral Hemodynamics During Exercise"

Dr. Patrick J. Drew
Dept. Engineering Science and Mechanics
The Pennsylvania State University



Friday, February 7th, 2014
LECTURE: 9:00 AM - 10:00 AM

ENGINEERING CENTER
ROOM EC 1112
10555 WEST FLAGLER STREET
MIAMI, FL 33174

Abstract: Hemodynamic signals are used extensively to infer neural activity non-invasively in humans, but the limits of their spatial localization and temporal dynamics are poorly understood. The systemic cardiovascular changes that occur during exercise are the most extreme experienced by a healthy organism, making locomotion an ideal perturbation to study the localization and dynamics of cerebral blood flow at their limits. Using two-photon microscopy and intrinsic optical imaging, we observe localized changes in hemodynamic signals during voluntary locomotion in awake mice. We then utilize a novel linear convolution model to dissect the spatial pattern of the response into arterial and venous components. We show that the localization and amplitude of the response are largely unaffected by pharmacological manipulations that increase or decrease blood pressure, indicating that the brain is well buffered from cardiovascular effects during natural behavior. Finally, we use electrophysiological recordings to demonstrate that the hemodynamic response co-localizes with neural activity during locomotion. Our results point to a model of cerebral blood flow that is linear and localized, even during large cardiovascular changes that accompany exercise.

Biography

Patrick Drew received his Ph.D. in neuroscience from Brandeis University, and did postdoctoral work at UCSD. He is currently an assistant professor in the departments of Engineering Science & Mechanics and Neurosurgery at Penn state. His lab studies neurovascular coupling and the development of the cerebral vasculature.

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