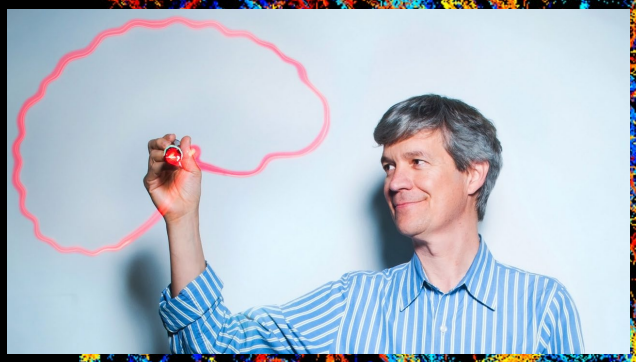
Seminar: Neurovascular function in health and disease

Date: Monday 2 October 2023 **Time:** 13:15 – 16:00
Venue: 1231-114 (Kollokvierum)



in connection with the visit:
Honorary Skou Professor David Boas,
Boston University

Organized by:
Vladimir Matchkov, Department of Biomedicine
Dmitry D. Postnov, Department of Clinical Medicine

Program:

13:15-13:30 *Non-invasive optical imaging of vascular dynamics @AarhusUniversity*. Dmitry D. Postnov

13:30-13:45 *Capillary dysfunction in the peri-ischemic brain region after stroke*. Vladimir Matchkov

13:50-14:30 ***Post-stroke disruption in neuro-vascular responses predict behavioral outcomes***. David Boas

14:30-15:10 *Capillary dysfunction: what can we learn from human data?* Leif Østergaard

15:15-15:30 *Preventing capillary flow disturbances in early-stage Alzheimer's disease with carbonic anhydrase inhibitors*. Eugenio Gutierrez

15:30-15:45 *Edema compression and hypercontractile parenchymal arteriole association to ischemia-reperfusion – A spatial transcriptomics approach*. Line Hansen

Post-stroke disruption in neuro-vascular responses predict behavioral outcomes

David Boas, PhD
Professor (BME, ECE) Director of Neurophotonics Center,
College of Engineering, Boston University

Abstract:

Functional neuroimaging, which generally measures vascular responses to brain activity, is invaluable for monitoring stroke patients during recovery. However, the neurophysiological interpretations of these vascular signals remains a challenge, and is under active investigation, as the stroke almost always alters the observed vascular signals. In other words, we do not know the effect of stroke on neurovascular coupling. To study this question, we simultaneously captured neuronal activity, through fluorescence calcium imaging, and hemodynamics, through intrinsic optical signal imaging, during longitudinal stroke recovery. We found that photothrombotic stroke to somatosensory forelimb altered neurovascular coupling in the acute phase within the affected forelimb and peri-infarct regions. Neurovascular coupling was reestablished in the chronic phase and acute recovery of neurovascular coupling predicted behavioral outcome. Stroke also resulted in increases in the power of global brain oscillations, which showed distinct patterns between calcium and hemodynamics and that increased calcium excitability in the contralesional hemisphere was associated with increased intrahemispheric connectivity. Additionally, acute increases in hemodynamic oscillations were associated with improved behavioral outcomes. These acute hemodynamic biomarkers predicting behavioral outcomes will guide future preclinical studies of novel stroke treatments and eventually impact human studies of functional recovery and the impact of acute therapies.