Neuroscience & Non-Communicable Diseases WEBINAR – All welcome

Friday 19 August 2022, 3pm

"Disturbance in the coupling between the neuronal tissue and the vasculature: A novel factor to consider in cerebrovascular disease"

Speaker: Christian Staehr, MD, Department of Biomedicine, Matchkov Lab, Aarhus University, Denmark

Biography:

Christian Staehr's main scientific interest is to study how cardiovascular dysfunction may be involved in neurological disorders. In his recent research, he has discovered a new link between migraine with aura and cardiac disease. His current focus is to investigate neurovascular coupling in animal models for inherited migraine, ischemic stroke, and stress-induced depression. His research suggests that restoration of balanced neurovascular coupling may be a novel treatment target in neurological disorders. Christian Staehr has been a visiting researcher at University of Vermont and at Boston University, where he has learned and further developed state-of-the-art imaging techniques to study neurovascular coupling. Christian published 11 research papers and two reviews and received several national and international awards for his scientific achievements.

Abstract:

An accurately balanced coupling between neuronal activity and vascular tonus of supplying blood vessels is essential for normal brain function and integrity. Neurovascular coupling ensures rapidly increased supply of oxygen and energy to active brain regions. The communication is believed to be transmitted through release of vasoactive substances from the active neuronal tissue, which in turns dilate resistance vessels and thus increase blood flow. Within the last decade, it has been increasingly evident that the capillary circulation also plays an important role in neurovascular coupling. Despite recanalization after ischemic stroke, neurovascular coupling is impaired in peri-ischemic brain regions. The mechanism underlying this dysfunctional neurovascular coupling is largely unknown.

We used single vessel photothrombosis to induce arterial occlusion in awake mice implanted with chronic cranial windows. Middle cerebral artery occlusion induced multiple spreading depressions associated with substantial reduction in blood flow in the peri-ischemic cortex. Approximately half of the capillaries in the peri-ischemic cortex were no longer perfused after reperfusion. The remaining perfused capillaries showed increased prevalence of dynamic flow stalling. After reperfusion, neurovascular coupling responses were strongly reduced in the peri-ischemic cortex.

In conclusion, arterial occlusion led to spreading depressions associated with long-lasting microcirculatory failure in the peri-ischemic cortex. This reduced capillary capacity may underlie impaired neurovascular coupling in peri-ischemic brain regions after stroke.

All welcome!

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