

## New insights in brain microcirculation and oxygenation

A new PhD project from Health, Aarhus University, shows how capillary flow patterns play an important role in the optimal oxygenation of brain tissue in health and disease. The project was carried out by Eugenio Gutiérrez, who is defending his dissertation on the 8<sup>th</sup> of November, 2016.

Oxygen is transported from the microvasculature to the brain tissue by passive diffusion and this process is typically modeled by the classical flow-diffusion equation. Previous mathematical models have shown that the homogenization of transit times counteracts the inherent reduction of oxygen extraction efficacy as flow increases. The failure to homogenize during an episode of hyperemia is known as capillary dysfunction. In his PhD project, Eugenio used in vivo imaging by two-photon microscopy to evaluate the capillary patterns in mouse brain cortex. In his project, Eugenio tested the model and shows that mean transit time (MTT) and capillary transit time heterogeneity (CTH) decreases during hyperemia as shown during functional activation and hypercapnia. However, during functional activation the MTT:CTH ratio (CoV) was reduced, which is consistent with a neurocapillary coupling mechanism at the level of individual capillaries. In his PhD project, Eugenio shows that the ability to homogenize is impaired in aged mice and in a mouse model of Alzheimer's disease which might jeopardize the optimal oxygenation of the brain tissue.

The defence is public and takes place on the 8<sup>th</sup> of November at 14:30 in the Eduard Biermann auditorium, Aarhus University, Vennelyst Blvd. 8, 8000 Aarhus C. The title of the project is "Brain Microcirculation in health and disease". For more information, please contact PhD student Eugenio Gutiérrez, email: eugenio@cfm.au.dk, Phone +45 4086 1281.