Ischemia, Reperfusion and Angiogenesis Retreat 24th October 2024 in Cologne

Program:

10 - 11 AM Keynote Speaker: Priv.-Doz. Dr. rer. nat. Markus Aswendt

Title: The role of astrogliosis in recovery after stroke - a functional connectivity study in mice

Summary:
Reactive astrocytes are key components of stroke pathophysiology and have different functions depending on the time point after injury. In contrast to the understanding of their cellular properties, their role in the functional network re-organization related to spontaneous functional recovery is still unknown. In my talk, I will describe the development of a multimodal workflow combining ultra-high field MR neuroimaging, atlas-based functional connectivity analysis using graph theory, motor behavior testing, and immunohistochemistry in mice with cortical stroke. This workflow allows the combination of atlas-based in vivo and ex vivo imaging data necessary for the study of functional recovery after stroke. I will demonstrate this using a GFAP/Vimentin knockout model with attenuated reactive astrogliosis as an example. Compared to wild-type animals, suboptimal reorganization of functional neuronal networks and maladaptive plasticity responses occur in the knockout. In contrast to the long-held view that glial scarring has only negative effects on regeneration, the results suggest that reactive gliosis is required to some extent for normalization of functional connectivity and recovery after stroke.

Related publications:
Aswendt M, Wilhelmsson U, Wieters F, Stokowska A, Schmitt FJ, Pallast N, de Pablo Y, Mohammed L, Hoehn M, Pekna M, Pekny M. Reactive astrocytes prevent maladaptive plasticity after ischemic stroke. Prog Neurobiol. 2022 Feb;209:102199. doi: 10.1016/j.pneurobio.2021.102199. PMID: 34921928.
Scharwächter L, Schmitt F, Pallast N, Fink GR, Aswendt M. Network analysis of neuroimaging in mice. Neuroimage. 2022 Jun;253(119110). doi: 10.1016/j.neuroimage.2022.119110. PMID: 35311664.
Pallast N, Diedenhofen M, Blaschke S, Wieters F, Wiedermann D, Hoehn M, Fink GR, Aswendt M. Processing pipeline for Atlas- based Imaging Data Analysis (AIDA) of structural and functional mouse brain MRI. Front. Neuroinformatics. 2019 Jun 4;13:42. doi: 10.3389/fninf.2019.00042. PMID: 31231202.

Biography sketch:
Markus Aswendt is a group leader at the Dept. of Neurology and leads the Neuro-MRI core unit at the University of Cologne, Germany. His research focuses on innovative methods to stimulate and visualize regenerative processes in experimental stroke. The methodological portfolio ranges from in vivo magnetic resonance imaging to behavioral testing, neuromodulation and microscopy. This multimodal approach is used to understand regeneration and brain network changes leading to functional recovery. His lab contributes to open science and standardization initiatives by providing tools for automated (atlas-based)

processing of MRI and microscopy data and reproducible workflows for research data management.

11:00 - 11:30 Discussion with Markus Aswendt

11:30 -14:00: Group presentations and Snacks

14:00-14:30: Get to the exhibition “Körperwelten”

14:30-onwards: Exhibition “Körperwelten”

17:00 PM End of retreat