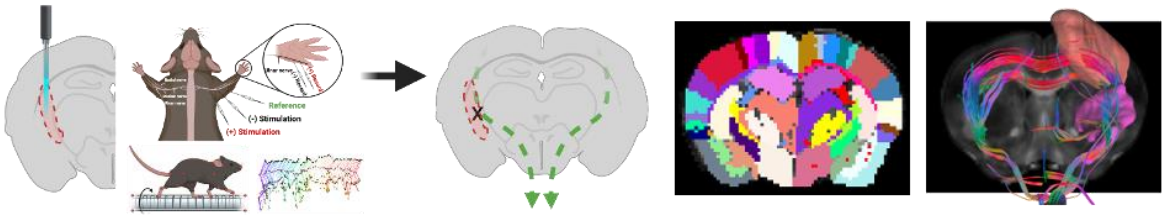
PhD Project

Understanding how white matter degeneration and plasticity influence motor recovery after stroke



SETUP
Internal capsule stroke + behavior + kinematics + MRI

AIM
Identify degeneration and plasticity in recovery-relevant tracts

Registered Allen Mouse Brain Atlas on in vivo DTI

DTI-based fiber tracking of primary motor cortex connections

Background

Structural connectivity, especially in descending motor tracts, predicts motor deficits and outcome after stroke in patients but animal studies are lacking. This gap hinders understanding of motor tract integrity's role in specific deficits like spasticity and the potential for white matter plasticity induced by transcranial direct current stimulation (tDCS). While tDCS has shown mixed results in clinical trials for spasticity rehabilitation, translating these findings has been challenging. This project aims to address this gap by studying the whole-brain structural connectome using diffusion MRI and behavior test throughout spontaneous and tDCS-accelerated motor recovery in the mouse model.

Approach

Your project will build upon an established experimental and analysis setup consisting of mouse surgery, motor behavior tests, in vivo MRI, and analysis software. You will participate in a large consortium of researchers working on motor control (https://www.crc1451.uni-koeln.de). You will be responsible for in vivo MRI data acquisition and processing, development of new analysis strategies for correlation of in vivo DTI to microscopy data and DTI measures to motor recovery after stroke.

You

- Expertise in (small animal) in vivo MRI (data acquisition and/or processing)
- Experienced user of Python and/or Matlab for developing and maintaining research software (libraries: numpy, nilearn, scipy, and/or imaging-specific: FSL, SPM, and ANTs)
- Expertise in using git/git-annex and GitHub for code/data versioning and collaborative work
- Solid computer science and bioinformatics skills are necessary, biostatistics and experience in mouse models of brain disorders and neuroanatomy would be advantage

Send your motivation letter, CV, and transcript of records to

PD Dr. Markus Aswendt, University Hospital Cologne, Dept. of Neurology
Markus.Aswendt@uk-koeln.de

Related references:

Pallast et al. NeuroImage 2020 [https://doi.org/10.1016/j.neuroimage.2020.116873]
Aswendt et al. Transl. Stroke Res. 2020 [https://doi.org/10.1007/s12975-020-00802-3]
Blaschke et al. Stroke 2023 [https://doi.org/10.1161/strokeaha.123.042808]