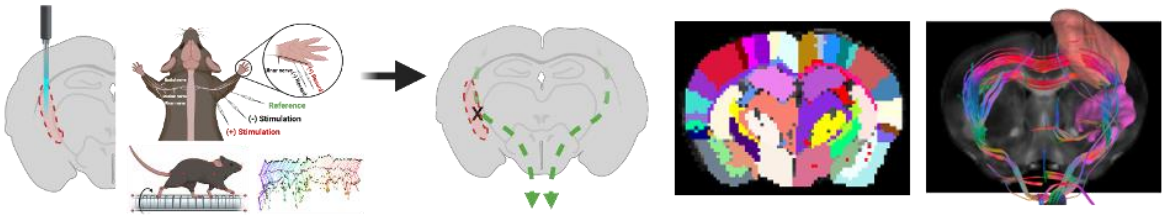
PhD Project

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

Translational studies in mice on how structural connectivity, especially in descending motor tracts, predicts motor deficits and outcomes after stroke 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, without a relevant mouse model of spasticity, translating these findings has been challenging. This project aims to address this gap by studying the whole-brain structural connectome throughout spontaneous and tDCS-accelerated motor recovery.

Approach

This project investigates motor execution deficits in a mouse model of internal capsule stroke, focusing on how tDCS-induced changes in structural networks affect recovery. It emphasizes white matter plasticity and links motor deficits to white matter damage using DTI and histology 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. In your project, 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

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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]