

PhD project 4: Quantification of olfactory tract tissue integrity as a surrogate marker of early to moderately advanced stages of Parkinson's disease and related disorders

Supervisor: Christoph Scherfler

Applications to: Neuroscience-PhD@i-med.ac.at

Impaired olfactory function is recognized as one of the earliest indicators of developing PD and one of the most prevalent non-motor symptoms. Postmortem studies have documented that the olfactory bulb is among the first affected sites in PD pathology. Diffusion tensor imaging and fiber tracking of the olfactory tract has recently been suggested to be a reliable MR-imaging marker to visualize and quantify diffusivity changes of the olfactory tract in PD and may in turn be useful for early diagnosis and monitoring of disease progression. Currently, the neuroimaging community is lacking standardized tools to adequately localize the olfactory tract and quantify its tissue integrity.

We will establish an automatized DTI (diffusion tensor imaging) MRI analysis algorithm for quantifying diffusivity changes of the olfactory tract on the basis of newly recruited and already in house data sets. In order to validate the newly generated software application, patients with prodromal to probable PD will be recruited in our movement disorders center and subjected to standardized clinical investigations and MRI. The amount of olfactory tract signal alteration will be associated with clinical outcome parameters with the intention to identify a surrogate marker for at risk PD and disease progression. Optionally other MRI parameters such as quantitative susceptibility mapping of the basal ganglia as well as voxel based analysis of whole brain diffusivity or volume changes can be investigated in this project.

The main role and responsibility of the student will be i) to assist in the planning and execution of in-hospital visits ii) to implement DTI analysis algorithm of the olfactory tract and optionally of other brain regions of the olfactory system with the help of in-house staff and, iii) to test the clinical application of the established image processing tool by evaluating its classification performance in the clinical setting.

Requirements for project 4:

- master's degree or equivalent in medicine which enable to interview and examine patients in Austria.
- knowledge in biostatistics (please provide certificate)
- basic proficiencies in working with linux operating systems on the command line basis
- excellent command of English and knowledge of German