Call for applications to the PhD program Translational Research in Neurodegeneration (TReND)

Medical University of Innsbruck, Austria

02.02.2023

Students with a keen interest in neurology are invited to apply for vacant doctoral positions within the PhD program TReND (Translational Research in Neurodegeneration) at the Medical University of Innsbruck, Austria.

This PhD program offers:

- 4-year funded PhD position (30 hours weekly / 14x monthly € 2.457,98 gross) according to the rates of the 'Kollektivvertrag' for PhD students at the Medical University of Innsbruck.
- Participation at 1 international meeting (Society for Neuroscience, American Academy of Neurology, Movement Disorders Society, or AD/PD International Conference on Alzheimer's and Parkinson's Disease and related neurological disorders), and twice at a meeting of the Austrian Society of Neurology or the Austrian Parkinson Society.
- Up to 6 months stay abroad at a collaborating institution.

Project specific information and requirements:

PhD project 1: Identifying prodromal Parkinson's Disease: A population-based multistep approach

Supervisor: Philipp Mahlknecht; Co-supervisor: Werner Poewe

Predoctoral clinical or non-clinical research fellows are warmly welcome to apply for this project, which consists in an already ongoing initial broad online screen of remotely assessable Parkinson's disease (PD) risk markers in the general population and in a subsequent in person assessment of higher risk participants. In-depth phenotyping will be undertaken by a variety of clinical, imaging, and biofluid assessments including alpha-synuclein seeding assays. The student's main role will be to participate in public outreach activities, perform the application of the risk algorithm to the online database and to assist in the planning and execution of the in-hospital visits of higher-risk individuals. Applications with a medical background will also have the opportunity to crosslink with the department of neurology PD and movement disorders outpatient clinic and the PD and neurodegenerative diseases clinical trials centre.

PhD Project 2. Prodromal RBD

Supervisor: Ambra Stefani; Co-supervisor: Matteo Cesari; Mentor: Birgit Högl

Project description: RBD is characterized by abnormal muscular activity and dream enactment in REM sleep. In its isolated form (iRBD), it is recognized as a prodromal alpha-synucleinopathy (i.e. Parkinson's disease, dementia with Lewy bodies and multiple system atrophy). Prodromal RBD is a more recent concept and refers to subjects who have subtle abnormal video or EMG findings, but do not meet criteria for RBD. Few studies have shown that both manifestations (EMG and video) are progressive, and some patients convert to full-blown RBD. Micro-sleep fragmentation identified with machine learning may be a marker of progression from prodromal RBD to RBD. However, progression rates and latencies into iRBD or even Parkinson's disease, dementia with Lewy bodies and multiple system atrophy have not been defined so far. A better definition and characterization of prodromal RBD would allow improved understanding of the earliest stages of alpha-synucleinopathies. With longitudinal follow-up, including yearly assessment of several biomarkers, and advanced statistics methods, we aim

to define new biomarkers to monitor progression and to indicate early conversion into further disease stages. We believe that this novel approach can revolutionize the approach to prodromal RBD.
Responsibilities and qualifications: During the first 3 years, patients with prodromal and isolated RBD will be recruited and followed-up, including advanced biomarker assessment. In the 4th year of PhD, the student will be involved in the PSG data analysis of the cohort as well as the generation and execution of a statistical algorithm for the definition of new prodromal and isolated RBD progression and early-conversion biomarkers.
The research will be conducted in a truly multi-disciplinary environment consisting of the medical doctors, engineers and somnologists.
Requirements for project 2:

- Medical degree;
- Knowledge of advance statistics and intermediate programming (please provide relevant certificates) or willingness to acquire this knowledge by achieving 30 ECTS on Digital Science from the University of Innsbruck (https://www.uibk.ac.at/disc/teaching/digital-science/) in addition to the regular Ph.D. courses;
- Command of German.

PhD project 3: Diagnostic and progression biomarkers in patients with early-stage neurodegenerative parkinsonism

Supervisor: Florian Krismer; Co-supervisor: Klaus Seppi

Recently diagnosed, drug-naïve patients with suspected neurodegenerative parkinsonism not satisfying diagnostic criteria of an established disease will be enrolled in a prospective study. All patients will be followed longitudinally over 24 months with annual follow-up visits. The primary aim of this study is to develop diagnostic, prognostic as well as progression markers in neurodegenerative parkinsonism through in-depth phenotyping. Skills and personal qualities: The applicant should have a masters or doctoral degree in medicine and a strong interest in neurodegenerative diseases. Knowledge in data management and analyses is a plus but is not mandatory. The main duties include: Assist in participant recruitment (screening, scheduling, and other participant outreach), clinical assessments and data analysis. Applicants will be offered the opportunity to strengthen their clinical skills in movement disorders by joining a multi-disciplinary team focusing on movement disorders.

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

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

PhD project 5: Pure autonomic failure: predictors of phenoconversion to Lewy body disorders and multiple system atrophy

Supervisor: Alessandra Fanciulli; Co-supervisor: Gregor K. Wenning

Thesis description: the project will focus on the deep clinical, imaging and biomarker phenotyping of people diagnosed with pure autonomic failure, who will be followed-up over 24 months for phenoconversion to multiple system atrophy or any Lewy body disorder. The objective of the study is to identify disease-specific markers of early phenoconversion. The tasks of the applicants will be to assist in the coordination and execution of the study visits, analysis of data and dissemination of the results. Applicants will also have the opportunity to get involved in other ongoing activities of the Innsbruck Dysautonomia Center.
What to expect:

- Individualized training in autonomic neuroscience, movement disorders, project management, effective speaking and scientific writing
- Lead authorship of the thesis-project publication
- Presentation of the thesis work at national and international congresses
- Involvement in the international autonomic and movement disorders research network.
- Possibility of stay-abroad periods for project purposes.

Requirements for project 5:

- Medical degree
- Proficiency in English and German
- Interest in autonomic neuroscience and movement disorders
- Management, team- and networking skills

PhD project 6: Early disease mechanisms of multiple system atrophy

Supervisor: Nadia Stefanova, Mentor: Sylvia Boesch

Multiple system atrophy (MSA) is a fatal neurodegenerative proteinopathy that differs from Lewy body disorders (LBDs) by its rapid progression and ectopic accumulation of misfolded a-syn in oligodendrocytes. Pathologic a-syn aggregates in oligodendroglia are considered a major culprit in the disease process but the underlying pathogenesis is unclear. Prion-like spreading of MSA-derived a-syn has been proposed, but evidence of oligodendroglia readily forming cytoplasmic inclusions is unavailable to date. We hypothesize that oligodendroglia are fundamentally dysfunctional in MSA as evidenced by the widespread formation of glial cytoplasmic inclusions (GCIs) associated with selective neurodegeneration. Neuroinflammation appears to be a further player in MSA disease progression. We will study how primary oligodendroglial changes affect altered neuroinflammatory responses in MSA. The applied methodology includes behavioral testing, stereotaxic surgery, immunohistochemistry and histopathology, biochemical and molecular analyses, and iPSC-based modelling.
Requirements for project 6:

- Master’s degree in neuroscience, biology, medicine, or related
- Skills in wet lab techniques and data analysis are desirable

Your application:

The positions are available immediately and will be open until filled. We look forward to receiving your application that includes:

(1) a cover letter (not longer than 1 page),
(2) a motivation statement (not longer than 1 page),
(3) a CV

Please generate a single PDF with
the file name:
Application 2023_YOUR NAME.pdf"
(size limit 9MB!)

and send to Neuroscience-PhD@i-med.ac.at with
the Subject:
"PROJECT SUPERVISOR NAME_PhD Application TReND 2023".