



Employer Description

The Misgeld lab at the Institute of Neuronal Cell Biology of Technical University of Munich (TUM) and the German Center for Neurodegenerative Disease (DZNE) develops and uses cutting-edge *in vivo* imaging and omics tools to study axon homeostasis and degeneration with a focus on neuronal cell biology and axon-glia interactions. We are interested in the mechanisms that establish and maintain axonal health, as well as in the processes that cause axon pathology during neurodegeneration and -inflammation (in diseases such as Amyotrophic lateral sclerosis or spinal cord injury).

Through its close association with major collaborative efforts (such as the Excellence Cluster Synergy and Collaborative Research Center TRR274) and leading neuroscience-training programs (such as the Graduate School for Systemic Neurosciences and the PhD Program Medical Life Science & Technology) our students have unique access to the technical resources and networking opportunities of the Munich neuroscience community.

At the same time, our lab is limited in size and very international (two post-doctoral fellows, six graduate students from seven different countries), ensuring close supervision and mentoring, as well as exposure to a diversity of experiences and viewpoints.

Links:

<https://web.med.tum.de/neuroscience/home/>

<https://www.dzne.de/en/research/research-areas/fundamental-research/research-groups/misgeld/research-areasfocus/>

<https://www.synergy-munich.de>

<https://www.sfb274.de/de>

<https://www.gsn.uni-muenchen.de>

<http://www.phd.med.tum.de/>

Job Description

A PhD position (65% E13) in the area of *in vivo* imaging of the rodent nervous system is available in the Misgeld lab at TUM's Institute of Neuronal Cell Biology. The position is available starting earliest 1.9.2022.

The project will focus on the *in vivo* dynamics of neuronal mitochondria, specifically elucidating the mitochondrial "lifecycle" in presynaptic terminals, its local regulation by neuronal activity, and its disruption during neurodegeneration. The work will involve a novel "pulse-chase imaging" approach in neuromuscular junctions, where individual mitochondria will be labelled with photo-switchable tools to track organelle position *in situ*. The approach will be complemented by other advanced imaging techniques established in the lab, such as correlative light-electron microscopy or two-photon imaging and combined with advanced molecular labeling and profiling tools, genetically-encoded biosensors and injury/disease models in mice.

The PhD candidate will have the opportunity to enroll in one of the structured neuroscience graduate programs in Munich.

Representative recent publications from the lab include:

Herwerth M, et al., A new form of axonal pathology in a spinal model of neuromyelitis optica. **Brain** **2022** 145(5):1726-1742

Wang M, et al., Completion of neuronal remodeling prompts myelination along developing motor axon branches. **J Cell Biol.** **2021** 220(4):e201911114

Jafari M, et al., Phagocyte-mediated synapse removal in cortical neuroinflammation is promoted by local calcium accumulation. **Nat Neurosci.** **2021** 24(3):355-367

Snaidero N, et al., Myelin replacement triggered by single-cell demyelination in mouse cortex. **Nat Commun.** **2020** 11(1):4901

Fecher C, et al., Cell-type-specific profiling of brain mitochondria reveals functional and molecular diversity. **Nat Neurosci.** **2019** 22(10):1731-1742

Witte ME, et al., Calcium influx through plasma-membrane nanoruptures drives axon degeneration in a model of multiple sclerosis. **Neuron** **2019** 101(4):615-624.e5

Relevant overview articles:

Misgeld T. & Schwarz T. Mitostasis in neurons: Maintaining mitochondria in an extended cellular architecture **Neuron** **2017** 96(3):651-666.

Plucinska G. & Misgeld T. Imaging of neuronal mitochondria in situ. **Curr Opin Neurobiol** **2016** 39:152-63.

Job Requirements

The applicant should have a Master's degree in neuroscience or a related field, and have interest in the fields of neuroenergetics, neuroanatomy and neurophysiology. Previous experience with rodent models, or with imaging, is an advantage, but not necessary. The lab's language is English. We are looking for someone, who simply loves science and shares our passion for the hard work and collaborative effort that exploring the unknown continent of our brain requires.

Application details

Please send a specific letter of motivation that explains your interests, your reasons for considering our lab (ideally referring to our past work), and your vision of science and your career; also include a CV, which details your grades, including high school, BSc and MSc plus the names of two to three referees, whom we can contact.

Please send you application by eMail indicating 'PhD application to Misgeld lab - Mito' in the header to

Monika Schetterer, Lab manager - Misgeld lab; monika.schetterer@tum.de

