

## **Postdoc/Asst Prof – The Glymphatic System, Brain Clearance and Neuroglia under physiological conditions and in disease models**

**The Center for Translational Neuromedicine at the University of Rochester invites applications for postdoctoral research associates and/or junior faculty positions in neuroscience to join the laboratory of Maiken Nedergaard, to study the glymphatic system and neuroglia signaling under physiological conditions and in disease models.**

### **Mission**

The neurobiology of glia cells is one of the most rapidly developing areas in neuroscience. For the first time in experimental history, *in vivo* imaging technologies permit the study of fundamental function of astrocytes in awake behaving animals. These experiments have challenged the idea that cognitive function is based only on neuronal circuits. In addition, astrocytes play a crucial role in clearance of solutes and neurotoxins from the brain to meningeal and cervical lymph vessels. This brain-wide clearance system, named the glymphatic system, is the primary focus of the lab.

The glymphatic system represents unique opportunities for novel fundamental discoveries. The glymphatic system has provided break-throughs in understanding why we sleep, mechanisms of neurodegenerative diseases, how edema forms in stroke, and has provided new information on biological timekeeping. The lab uses multiple alternative approaches and works closely with fluid dynamicists to develop new models understanding how brain fluid flow and brain activity work together. A natural extension of this work includes the regulation of extracellular ion concentrations and the impact of extracellular K<sup>+</sup> on neural circuits. We are seeking candidates interested in furthering this work, and expanding the field's knowledge into models of stroke, chronic neuropathic pain and chronic stress. Technical approaches include utilizing and refining *in vivo* imaging in awake behaving mice, macroscopic fluorescence imaging and 2-photon and macroscopic imaging, optogenetics, patch clamping, LFP recordings, EEG recordings, ion-measurements, microdialysis, RNA-seq, and animal models of diseases including Alzheimer's disease, traumatic brain injury, multiple sclerosis, spinal cord injury, circadian misalignment, stroke and more.

The mission of the Center for Translational Neuromedicine at the University of Rochester ([www.urmc.rochester.edu/labs/Nedergaard-Lab](http://www.urmc.rochester.edu/labs/Nedergaard-Lab)) is to create a unique platform for complex research of glial cells in health and disease. The lab has an extensive network of collaborators, and the two arms of The Center for Translational Neuromedicine (CTN) at the University of Rochester, NY and at Copenhagen, Denmark facilitates multi-national collaborations.

### **Research:**

- **The glymphatic system**  
To investigate the basic molecular and cellular mechanisms of glymphatic function and how it is affected in disease. We value the following skills: optical *in vivo* microscopy, optogenetic manipulations, glia biology, complex data analysis, the peripheral lymphatic system.
- **Physiology of astrocytes- neuroglia signaling**

Experiments will focus on astroglia involvement in regulation of sleep and contribution to cognition. Desirable skills include slice and in vivo patch clamp, extracellular recordings incl. LFP, ion-sensitive electrodes and 2-photon in vivo imaging. Optogenetics and sniffer approaches. Programming skills (Matlab, LabVIEW, Python, etc.) are desirable.

- **Chronic neuropathic pain**

To investigate neuroimmunological and glymphatic mechanisms of chronic neuropathic pain in murine sparse nerve injury and spinal chord injury models. Desirable skills include small animal recovery surgery, in vivo LFP recordings, in vivo microdialysis for cytokines, 2-photon and macroscopic in vivo imaging, sleep and circadian behavioral analysis.

- **Circadian control of cerebrospinal fluid distribution between the brain and body**

Experiments will be designed to understand how and why CSF switches between the glymphatic system in the brain and lymphatic system in the periphery, and how this may change in response to models of shift work and jetlag. Experience with in vivo microscopy, in vivo circadian reporters, behavioral analysis, lymphatic biology, sleep or circadian biology, live animal surgery, and the immune system are valued.

## **Center for Translational Neuromedicine**

<https://www.urmc.rochester.edu/ctn.aspx>

Candidates will be part of the Center for Translational Neuromedicine, located at the University of Rochester Medical Center, Rochester, NY. The University of Rochester currently ranks 32 on US News ranking, ahead of UC San Diego and NYU. There is a possibility of new postdocs getting their own 2-photon or electrophysiology set up. Technical support in the lab includes a technician dedicated to preparing mice for imaging, including thin skull, acute and chronic cranial windows and implants. Specific projects will be determined according to the candidate's interest and experience. Career development including help with funding applications will be provided.