Studying bladder dysfunction in a rat model for Multiple Sclerosis

Project outline: Multiple Sclerosis (MS) is the most common inflammatory and demyelinating disease in young adults. Clinical course of the disease is defined in early stages by relapses. During later disease stages, patients suffer from progressive neurological disability. The urologic system is one of the most affected organ systems in MS patients. Up to 90% of all MS patients are affected by neuro-urological symptoms during the disease course such as urge-incontinence, overactive bladder or detrusor sphincter dyssynergia (Pannek et al., 2014). These bladder disorders are responsible for significant distress in the patients and are therefore an important target to treat during the disease course. Nevertheless there are no causal therapies approved, hence a reliable MS animal model to study the bladder dysfunctions is urgently needed.

Our research group has developed lately a new tool to measure bladder (dys)function in awake rats including electromyography of the bladder sphincter in order to distinguish the most dangerous bladder dysfunction type, the detrusor sphincter dyssynergia. We would like to make use of this new tool to measure bladder function in rats affected with Experimental autoimmune encephalomyelitis (EAE). This experimental disease is a well-acknowledged animal model for MS.

Purpose of this study is in a first step to investigate the types of bladder dysfuntions which arise in animals suffering from EAE. Additionally, analyze which affected parts of the central nervous system cause which type of bladder dysfunctions. In a second step, compare these types to a population of human patients affected with MS. A third possible step includes the investigation of possible therapies to enhance bladder function in rats.

Techniques to learn: Our lab is equipped with state-of-the art devices and techniques (Professor Martin Schwab, http://www.hifo.uzh.ch/research/schwab.html). The student will learn a wide variety of lab techniques mainly including *in vivo* work: Animal handling, behavior and surgery (under supervision), urodynamic testing of rat bladder function; tissue processing, histology and immunohistochemistry; epifluorescence and brightfield microscopy, data processing (Photoshop, MatLab), and statistical analysis (Graph pad). This includes a possibility for a co-authorship publication in a peer-reviewed journal.

Location, supervision: The project is a close collaboration between Professor Martin Schwab, laboratory of Neural Regeneration and Repair, Brain Research Institute, University of Zürich and ETH Zürich and PD Dr. med. Thomas Kessler, Balgrist University Hospital (http://www.balgrist.ch/desktopdefault.aspx/tabid-29/31_read-541/). Since the study is translational, the student will get the possibility to visit the hospital and see the similar urodynamic investigations in human patients for integral understanding.

The student will be directly supervised by two experienced medical doctors absolving their PhD (Dr. med. Marc P. Schneider mschneider@hifo.uzh.ch; Dr. med. Benjamin V. Ineichen, Ineichen@hifo.uzh.ch).

Duration: 6 – 12 months.

Student's profile: ambitious students with accurate working skills can send their application including a letter of motivation, a CV and bachelor scores to mschneider@hifo.uzh.ch or Ineichen@hifo.uzh.ch. Only excellent students will be considered.