

## **NENS Exchange Grant – Training Stay Report**

**Host Institution:** Laboratory of Neural Regeneration and Repair from Brain Research Institute, University of Zurich, Switzerland

**Supervisors:** Prof. Martin Schwab, PhD (PI); Marc Schneider, MD, PhD; Andrea Sartori, MSc

**PhD student that awarded NENS grant:** Raquel Leal Monteiro Mano de Oliveira

As a PhD student at the Doctoral Program in Neuroscience and as a collaborator of Neuro-Urology group from Oporto's Faculty of Medicine and i3S I have been focusing my research in the study of bladder dysfunction that results from spinal cord injury (SCI). The main goals of my PhD project consist in the characterization of the pathophysiology of neurogenic detrusor overactivity, a condition that frequently develops after injury and that is one of the main concerns for SCI patients, as well as to fine-tune its current therapeutic strategies. Therefore, to accomplish those aims and to improve the translational power of my group's research we emergently needed to improve our setup for cystometric recordings in order to measure bladder reflex activity during disease progression in fully awake animals. Consequently, I applied and was successfully awarded with a NENS exchange grant that allowed me to join Prof. Martin Schwab's team at the University of Zürich, Switzerland and to be trained in a newly developed protocol to access bladder activity in a fully awake rat model.

I joined Prof. Schwab's group from 23<sup>rd</sup> of January to 2<sup>nd</sup> of March (6 weeks), and during that period I was trained by the PhD student Andrea Sartori in several research techniques that will be valuable for my further studies. Firstly, I was instructed to perform the surgical procedures for the implantation of bladder catheters and external urethral sphincter (EUS) electrodes to simultaneously measure bladder reflex and EUS activities in the same experimental animal in several time points of disease development. Moreover, I was familiarized with their cystometric recording system and got all the information about suppliers and catalogue numbers that will be useful for the establishment of a similar system in our lab at the Faculty of Medicine of Porto. Furthermore, with the help of Marc Schneider, MD, PhD, I was trained in the identification of the major pelvic ganglia in rats, that will be crucial for the development of one of my project tasks that is related to the characterization of the ascending micturition pathways and further study of modifications occurring in NDO condition.

Regarding spinal cord injury rat models, I had the chance to observe the surgery leading to the development of a rat model of spinal cord incomplete transection that is completely established in Prof. Schwab's group. This animal model of SCI is undoubtedly

more translational than the one of complete cord transection that we have been used, as it better mimics the SCI condition in humans and is also a reliable model to study bladder dysfunction. Therefore, we intend to establish this model in our lab and to consider that methodology in our further studies in order to replace the complete transection procedure that is more aggressive and is less translational.

During the first week of my stay I was also invited to attend the Swiss Continence Foundation Annual Meeting, which took place in Zurich from the 25<sup>th</sup> to the 28<sup>th</sup> of January. During the meeting I attended the workshop of Animal Models for Neurourological Research as well as seminars from very influent researchers in the field of neuro-urology. Thus, I was able to learnt some new concepts about urological research that will certainly influence my further studies and experiments. Back in my lab at the Faculty of Medicine of Porto, me and my colleagues, together with the team from Zurich, are now joining efforts to establish the same model of cystometric and EUS recordings in fully awake animals, at Porto. This will be the starting point for a collaboration project in which both teams intend to dissect the mechanisms of bladder dysfunction after spinal cord injury.

In what concerns commitment to neuroscience research this training stay in Zürich was an extraordinary opportunity as I was able to get new research skills that will be very important in my future works. I had the opportunity to work with extraordinary scientists that shared with me new techniques and concepts that will be essential for the progression of my PhD. In addition to the remarkable scientific environment, this short stay was also a period of personal enrichment and for all reasons mentioned above I acknowledge NENS and the Portuguese Society for Neuroscience, I am very grateful to have been awarded with a NENS exchange grant that provided me the opportunity to collaborate with Prof. Schwab's group.



**Figure 1:** Cystometric recordings system. In the picture are represented the infusion pump, the pressure transducer, the scale, the restrained, the bladder infusion catheter, the electric wire to connect the electrodes and the amplifier.