Proposal of Master Research Project / Trabajo fin de Master for the academic year 2022-23

Group name: **Wiring and Function of Somatosensory Circuits**
IP name: **Francisco J Taberner**
Group web: **https://in.umh-csic.es/es/grupos/conectividad-y-funcion-de-circuitos-somatosensoriales/**

Title of the MRP/TFM:
Characterization of the effects of anesthetics in spinal cord microcircuits processing sensory stimuli.

Summary of the Project:
Circuits first integrate sensory information from different body parts at the dorsal horn of the spinal cord. Specific microcircuits of spinal interneurons balance the input from different somatosensory modalities (pain, touch, itch…), relaying the processed information to the projection neurons and eventually to the brain. Understanding how this integration occurs is a matter of active research in the somatosensory field. One of the most powerful tools to understand circuit function is “in vivo” calcium imaging using multiphoton microscopy and genetically encoded calcium indicators. In spinal cord studies, this technique implies the application of different stimuli in asleep animals. Although anesthetics affect sensory processing to a greater or lesser extent, the effect of these common compounds on spinal cord microcircuits has been overlooked. However, they can confound results from in vivo calcium imaging or multi-electrode recordings.

By capturing spinal circuits responding to different sensory stimuli using activity-dependent genetic labeling (TRAP2 mouse) with and without anesthetics, we will capture the significant differences caused by those compounds. We will then visualize them by the iDisco tissue clearing technique to get an overview of the attenuation of sensory circuits. Finally, we will use immunohistochemistry to characterize alterations in the recruitment of key subpopulations of spinal interneurons in response to light touch, thermal pain, or inflammatory pain to characterize specific subpopulations of spinal interneurons.

The previous experiments, together with in vivo calcium imaging using two-photon microscopy of dorsal horn interneurons, will offer an in-depth view of how commonly used anesthetics affect sensory processing at the dorsal horn of the spinal cord.

Methods and technology involved in the MRP/TFM Project:
TRAP2- based circuit capturing
iDisco tissue clearing, and 3D image acquisition and processing
Immunohistochemistry with high content acquisition of images
In vivo calcium imaging

Member/s of the lab who will act as tutor/co-tutor of the project (if different from the group IP):

Contact: ftaberner@umh.es