



MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2024-2025

(internship from January to June 2025)

Host laboratory: *Name + address*

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Host team : *team name + website*

Laboratory of Dr. Frederic Bretzner
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Internship supervisors : *name + position + email*

Dr. Frederic Bretzner
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Project title :

Functional contribution of genetically identified neurons of a subcortical locomotor center to locomotor recovery after spinal cord injury

Project summary : *approx 10 lines*

Combining optogenetic, electrophysiological, kinematic, neuroanatomical and imaging techniques in transgenic mice, our team has identified and characterized the role of different midbrain and medullary neuronal populations involved in the initiation, modulation and termination of locomotion in physiological conditions (Josset et al., 2018 Current Biol.; Lemieux and Bretzner, 2019, Plos Biol.). We have recently demonstrated that it is possible to manipulate these neuronal populations to improve functional motor recovery in experimental models of neurotraumatic injury (Roussel et al., 2023 Cell Reports Medicine; Lemieux et al., 2024, Nature Communications).

Using a combination of kinematic and electrophysiological techniques with discrete optogenetic or pharmacogenetic manipulations, the goal of this project will be to identify, localize, and characterize the functional contribution of genetically identified neuronal populations of a subcortical locomotor center to postural and locomotor recovery after spinal cord injury.

3-5 recent publications :

Lemieux M, Karimi N, Bretzner F. (2024). Functional plasticity of glutamatergic neurons of medullary reticular nuclei after spinal cord injury in mice. *Nat Commun.* 15, 1542.

Roussel M, Lafrance-Zoubga D, Josset N, Lemieux M, Bretzner F. (2023). Functional contribution of mesencephalic locomotor region nuclei to locomotor recovery after spinal cord injury. *Cell Rep Med.* 4, 100946.

Lemieux M, Bretzner F. (2019). Glutamatergic neurons of the gigantocellular reticular nucleus shape locomotor pattern and rhythm in the freely behaving mouse. *PLoS Biology.* 17, e2003880.

Josset N, Roussel M, Lemieux M, Lafrance-Zoubga D, Rastqar A, Bretzner F. (2018). Distinct contributions of mesencephalic locomotor region nuclei to locomotor control in the freely behaving mouse. *Current Biology.* 28, 884-901. e3.