INT Symposium on "Advanced Photonic Imaging in Neuroscience"

11th and 12th July 2019 Marseille, France

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Julien Bouvier completed his PhD on the developmental origin of brainstem respiratory neurons, with Dr. Gilles Fortin. For his postdoctoral training he joined the laboratory of Prof. Ole Kiehn's at the Karolinska Institute in Stockholm and contributed to identify brainstem and spinal cord circuits controlling locomotion. Since 2018 he leads a team that aims at characterizing the identity, function and connectivity of brainstem and spinal cord neurons involved in the elaboration of adaptative respiratory and locomotor behaviors. Techniques used in his group include ex-vivo electrophysiology, calcium-imaging, viral-based anatomical circuit tracings, and in vivo optogenetics and behavior.

S3-L1 '*Anatomical and functional deciphering of locomotor neuronal circuits in the mouse brainstem and spinal cord.*'

In vertebrates, the essential circuit driving hindlimb movements during walking is located in the lumbar spinal cord and termed a central pattern generator (CPG). However, locomotion is by nature episodic: it must be precisely initiated and stopped in response to various sensory or internal cues. Reticulospinal (RS) neurons, i.e. spinally-projecting neurons of the brainstem reticular formation, are prime candidates for directly gating the locomotor CPG but the identification of functional subgroups of RS neurons remains largely incomplete. In addition, little is known about the behavioural context(s) and the precise upstream circuit(s) that mobilize specific subgroups of RS neurons.

To a large extent this caveat owes the complexity, heterogeneity and intermingled nature of the brainstem reticular formations. In these structures, classical considerations relying on anatomical coordinates do not suffice to manipulate neurons and circuits with a meaningful selectivity. This talk will illustrate how advanced intersectional methods for defining, labelling, tracing the input/output connectomics and for manipulating the activity of neurons are progressively helping to build a unified understanding of the supra-spinal locomotor network. This work has promising benefits for neurorehabilitation and repair strategies for motor defects.