Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2020-2021

Laboratory/Institute: Grenoble Institut Neurosciences - GIN  Director: Prof. F. Saudou
Team: Stimulation cérébrale et neuroscience des systèmes  Head of the team: Dr O. David
Name and status of the scientist in charge of the project: B. Piallat, MCF UGA  HDR: yes
Address: GIN, Bâtiment Edmond J.Safra, Chemin Fortuné Ferrini, 38700 La Tronche  e-mail: Brigitte.piallat@univ-grenoble-alpes.fr

Program of the Master’s degree in Biology:
☐ Immunology, Microbiology, Infectious Diseases  ☐ Integrative Structural Biology
☐ Physiology, Epigenetics, Differentiation, Cancer  X Neurosciences and Neurobiology
☐ Planta International

Title of the project: Study of the hypothalamic control of the respiratory function

Objectives (up to 3 lines): In this study, we aim to use deep brain stimulation (DBS) to map areas of the hypothalamus that may be involved in control of breathing, and therefore determine the potential targets of DBS to treat central hypoventilation.

Abstract (up to 10 lines): We propose a Master 2 study on the involvement of the hypothalamus in breathing control. This work will be carried out under the direction of Dr Brigitte Piallat of the GIN with Dr Florence Cayetanot of the UMR-S1158 Inserm-Sorbonne University who will co-supervise this work. This pilot study is funded by the CCHS (congenital central hypoventilation syndrome) foundation. DBS emerges as a treatment option of motor disorders in many neurological diseases (i.e. Parkinson’s disease). More recently, it is tested in different parts of the brain to address other symptoms such as hypertension, obesity or sleep disorders. We aim to determine if DBS in the hypothalamus could modulate breathing, and if yes, which hypothalamic areas would be the most relevant potential targets to enhance ventilation in CCHS patients. If hypothalamic DBS improves breathing, this technique may be considered as a new treatment option of hypoventilation for patients with CCHS. Furthermore, mapping hypothalamic areas involved in control of breathing will open up large windows of research to unknown and/or even unexpected aspects of the tangled mechanisms of brain control of breathing.

Methods (up to 3 lines): In 2 non human primates, chronic electrodes will be implanted for measurement of neurological and respiratory parameters (respiratory rate, inspiratory time, PO2 and PCO2 values). The lateral hypothalamus involvement in breathing and sleep/wake behavior will be studied by analyzing the local field potentials at baseline and after stimulation during different periods of the sleep/wake cycles.

Up to 3 relevant publications of the team:


Requested domains of expertise (up to 5 keywords):
neurophysiology, non human primate experiments, respiratory physiology, electrophysiology
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