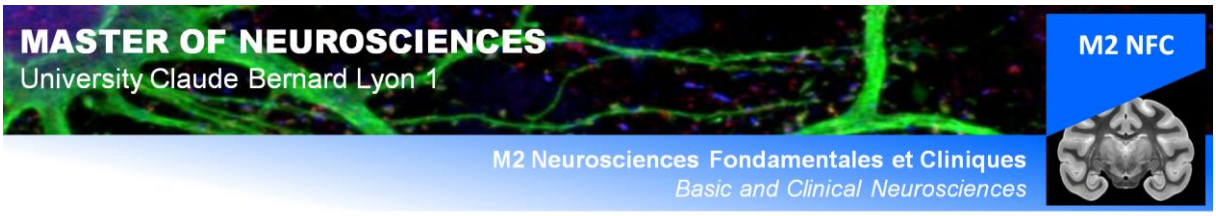

MASTER 2 Neurosciences Fondamentales et Cliniques

Internship proposal 2021-2022

(internship from January to end of May 2022)

Host laboratory: Centre de Recherche en Neurosciences de Lyon Centre Hospitalier Le Vinatier - Bâtiment 462 - Neurocampus
40 Avenue du Doyen Jean Lépine
69500 Bron

Host team : Neurobiology and Plasticity of Olfactory Perception (NEUROPOP)
https://www.crnl.fr/en/equipe/neuropop

Internship supervisors : *Nicola Kuczewski assistant professor (Nicola.kuczewski@univ-lyon1.fr)*

Project title: The role of Na^{2+}-activated potassium current in shaping the intrinsic firing pattern of Mitral Cells (MC) in the olfactory bulb.

Project summary: The cellular biophysical proprieties play a major role in the firing pattern produced by neurons. MC's, the principal output neurons of the olfactory bulb, display a spontaneous firing activity characterized by bursts of action potentials intermixed with periods of inactivity. We have recently dissected the cellular mechanisms responsible of such activity by showing that the bursts are produced by a dynamic modification of the AP threshold that is induced by the post spike afterhyperpolarization (AHP). In particular the early and fast component of the AHP, bringing the AP threshold below the membrane resting potential, act as regenerative mechanism of the burst firing while the late and slower component stop the burst. While the two AHP components are produced by the opening of potassium channels the nature of the letters are not yet known. We hypotheses that slow AHP component is linked to a build-up of intracellular Na^{2+}, along the firing, that activate the Na^{2+}-dependent potassium channels present in these neurons. During its internship the M2 student will test this hypothesis by performing patch-clamp electrophysiological recording and sodium imaging experiment on slices from mouse olfactory bulb.

Please send your proposal to emiliano.macaluso@univ-lyon1.fr and marion.richard@univ-lyon1.fr for publication on the Master of Neuroscience website.

3-5 recent publications :

Fourcaud-Trocmé N, Zbili M, Canepari M, Viret P and Kuczewski N(In preparation)
After-hyperpolarization promotes the firing of mitral cells through a voltage dependent modification of action potential threshold.

Ait Ouares K , Jaafari N, Kuczewski N, Canepari M (2020)
Imaging Native Calcium Currents in Brain Slices. dv Exp Med Biol 1131:73-91

Ait Ouares K, Beurrier C, Canepari M, Laverne G, Kuczewski N (2019)
Opto nongenetics inhibition of neuronal firing. Eur J Neurosci 49(1):6-26.

Duménieu M, Fourcaud-Trocmé N, Garcia S, Kuczewski N(2015)
Afterhyperpolarization (AHP) regulates the frequency and timing of action potentials in the mitral cells of the olfactory bulb: role of olfactory experience. Physiol Rep. 3(5).