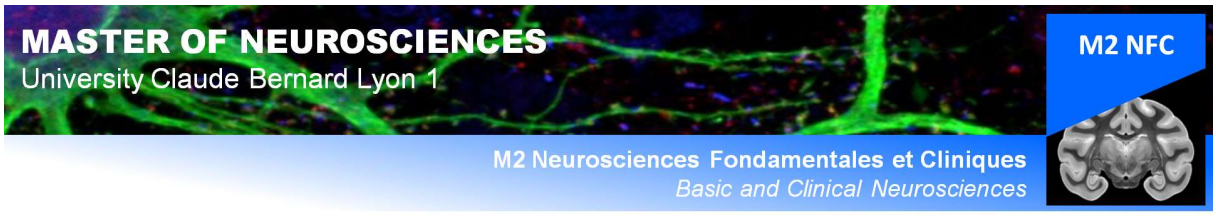

MASTER 2 Neurosciences Fondamentales et Cliniques

Internship proposal 2021-2022

(internship from January to end of May 2022)

Host laboratory: *Lyon Neuroscience Research Center (CRNL)*

Host team : *WAKING (*https://www.crnl.fr/en/equipe/waking*)*

Internship supervisors : *Hay Audrey, CRCN, ah831@cam.ac.uk*

Project title : *Identification of the shaping mechanisms of cortical network activity supporting memory consolidation.*

Project summary : *A general model of memory consolidation assumes that labile information are transferred from hippocampus to the neocortex. This process occurs primarily at night during slow wave sleep. Electrophysiologically, hippocampal sharp wave ripples (SWR) constitute a signature of information transfer .*
It has recently been shown that SWR are preceded by a reduction of cortical interneurons activity. This could have a permissive effect on information transfer. However, the mechanism allowing for the coordination of SWR and reduction of cortical interneuron activity is unknown. We hypothesise that midline thalamic neurons could orchestrate the synchronisation. These neurons show bi-directional connections with the neocortex and the hippocampus. In the neocortex, midline thalamic neurons target the inhibited cortical interneurons.
Project: During the M2 project, we will investigate if hippocampal neurons target the thalamic neurons that project to the inhibited cortical interneurons. We will determine the biochemical markers expressed by the thalamic neurons that relay hippocampal inputs. This project will require learning basic skills in surgery for tracers injection, slice electrophysiology and immunochemistry. These results will be the basis of a PhD project aiming at determining, using optogenetic tools and electrophysiology in naturally sleeping mice, if the thalamus signals the neocortex to get ready for the arrival of a SWR and therefore could promote memory consolidation.

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 :

1- Hay YA, Deperrois N, Fuchsberger T, Quarrell T, Koerling AL, Paulsen O. Thalamus mediates neocortical Down state transition via GABAB receptor-targeting interneurons. In revision at Neuron.
2- Jarzebowski P, Tang CS, Paulsen O, Hay YA. Impaired spatial learning and suppression of sharp wave ripples by cholinergic activation at the goal location. Elife. 2021 Apr 6;10:e65998. doi: 10.7554/eLife.65998. PMID: 33821790; PMCID: PMC8064750.
3- Hay YA, Naudé J, Faure P, Lambolez B. Target Interneuron Preference in Thalamocortical Pathways Determines the Temporal Structure of Cortical Responses. Cereb Cortex. 2019 Jul 5;29(7):2815-2831. doi: 10.1093/cercor/bhy148. PMID: 30059985.