

MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2023-2024

(internship from January to June 2024)

Host laboratory: MeLiS Laboratory, CNRS UMR 5284 | INSERM U1314, Université Claude Bernard Lyon 1, Institut NeuroMyoGène

Host team : Behaviour, plasticity and memory in larval zebrafish: Randlett.

https://www.randlettlab.com/

Internship supervisors : *Owen Randlett, Group Leader, CRCN Inserm. Owen.randlett@univ-lyon1.fr*

Project title : The role of Melatonin receptors in modulating learning

Project summary :

We work with larval zebrafish, which are a very small and transparent model vertebrate that can be trained to form long-term memories. We have developed paradigms to train larvae to ignore repeated stimuli. This simple form of learning is known as habituation, and offers a tractable paradigm to study the general phenomenon of learning and memory. Despite the apparent triviality of habituation (simply learning to ignore a given stimulus), how the brain actually accomplishes this selective filtration of specific stimuli is still largely mysterious. Indeed, we have shown that habituation is a complex phenomenon that involves multiple independent plasticity events that each tune individual components of behaviour. Our group aims to gain insights into this process at the molecular, cellular and circuit levels.

We have found that Melatonin is a potent modulator of habituation learning, and does so through the cooperative action of two G protein coupled receptors (GPCRs). In this project, we will characterize the expression pattern of these melatonin receptors through transgenesis and in situ hybridization, and identify the role that these neurons play in learning using Ca2+ imaging, 2-photon laser ablation and optogenetics, and ask how Melatonin signaling through these receptors alters neuronal physiology and plasticity.

Methods: Ca2+ imaging, quantitative behaviour, transgenesis, optogenetics

Please send your proposal to <u>marion.richard@univ-lyon1.fr</u> for publication on the Master of Neuroscience website.



3-5 recent publications :

Inhibition drives habituation of a larval zebrafish visual response. Lamiré LA, Haesemeyer M, Engert F, Granato M, Randlett O. eLife, (2023). <u>doi.org/10.7554/eLife.84926.1</u>

Distributed Plasticity Drives Visual Habituation Learning in Larval Zebrafish. Randlett O, Haesemeyer M, Forkin G, Shoenhard H, Schier AF, Engert F, Granato M. **Current Biology** (2019) 29(8):1337-1345

Whole-brain activity mapping onto a zebrafish brain atlas. Randlett O, Wee CL, Naumann EA, Onyeka N, David S, Fitzgerald JE, Ruben P, Lacoste AMB, Clemens R, Florian E, Schier AF. **Nature Methods** (2015) 12(11):1039–1046.

Full list of publication: googlescholar.randlettlab.com

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