MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2026-2027

(internship from January to June 2027)

Host laboratory: *Centre de Recherche en Neurosciences de Lyon, Centre Hospitalier Le Vinatier, Bâtiment 416 Unité de Recherche, 95 boulevard Pinel, 69500 Bron*

Host team: *BrainGuard*

Internship supervisors: *Olivier Raineteau, DR2, olivier.raineteau@inserm.fr*

Project title: Whole brain quantifications of cell responses to adverse conditions.

Project summary: *The brain is not simply a collection of cells, but a spatial solution to a physical problem: ensuring that every cell receives sufficient oxygen and nutrients through a dense and highly organized vascular network. During development, this delicate organization can be disrupted by perinatal brain injuries, leading to long-term alterations in brain function. These alterations affect not only neural cells, but also microglial cells and the vascular network itself, ultimately impacting the formation and function of neuronal circuits.*

The hosting laboratory studies how early-life brain injuries reshape the spatial organization of the brain and how different cell types respond to these perturbations. To address these questions, the lab combines large-scale histological imaging with single-cell transcriptomic approaches, generating datasets that require modern "big data" analysis methods.

During this internship, you will use recently developed pipelines to quantify microglial cells and blood vessels, as well as their proximity, throughout the entire mouse brain. By comparing control and perinatally injured animals, you will explore how early adverse conditions alter brain organization, vascular architecture, and microglial reactivity across space. Students interested in transcriptomics will also have the opportunity to complement these analyses using single-cell RNA sequencing datasets and workflow established in the hosting lab.

By the end of the internship, you will have acquired advanced expertise in histology, whole-brain image analysis, and quantitative approaches increasingly used in modern neuroscience. You will also gain experience in handling large multidimensional datasets, a rapidly expanding field at the interface of neuroscience, imaging, and computational biology.

3-5 recent publications:

Huré JB, […] **Raineteau O*,** Parras C* (2024) Pharmacogenomic Screening Identifies and Repurposes Leucovorin and Dyclonine as Pro-Oligodendrogenic Compounds in Brain Repair. Nat Comm. 15(1):9837
Foucault L, […] **Raineteau O** (2024) Neonatal brain injury unravels transcriptional and signaling changes underlying the reactivation of cortical progenitors. Cell Rep. 43(2):113734

Marcy G, Foucault L, […] **Raineteau O** (2023) Single-cell analysis of the postnatal dorsal V-SVZ reveals a role for Bmpr1a signaling in silencing pallial germinal activity. Sci Adv. 9(18):eabq7553

Donega V, […] **Raineteau O** (2018) *Transcriptional Dysregulation in Postnatal Glutamatergic Progenitors Contributes to Closure of the Cortical Neurogenic Period.* Cell Rep. 22(10):2567-2574

Azim K, Angonin D, […] **Raineteau O** (2017). *Pharmacogenomic identification of small molecules for lineage specific manipulation of subventricular zone germinal activity.* Plos Biology; *15(3):e2000698*