

## **MASTER 2 Fundamental and Clinical Neurosciences**

### **Internship proposal 2026-2027**

*(internship from January to June 2027)*

**Host laboratory:**

CRNL Centre de Recherche en Neurosciences de Lyon (Dir L. Bezin), Centre Hospitalier Le Vinatier, Bâtiment 462 Neurocampus Michel Jovet, 95 boulevard Pinel, 69500 Bron

**Host team :**

NEUROPAIN team – Intégration centrale de la douleur (Dir: Roland Peyron), Hopital Neurologique, Bron

**Internship supervisors :**

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**Project title :**

Study of the connectomes of patients with Facial Vascular Pain during the different periods of the disease and in comparison to the connectomes of a control group

**Project summary :**

This internship is part of a larger project: "Exploration of the pathophysiology of cluster headache in PET-MRI using [18F]F13640".

Cluster headache is manifested by very intense and disabling painful attacks of the face which can lead to suicidal behavior. It is characterized by a stereotypical clinical picture and circadian and circannual rhythmicity. Active periods (crises can reach a frequency of 8 per day) last a few weeks, often at the same times of the year. These active periods are separated by inactive periods without pain lasting more than a month.

In this study, brain images are acquired in the inactive period and in the active period with PET-MRI to combine on the one hand the PET exploration of 5-HT1A receptors, and on the other hand the exploration by MRI of brain activation, functional connectivity and perfusion. The data can be compared to control subjects from a previous study.

The internship will be dedicated to the analysis of MRI images to study functional connectivity and the trainee will participate in the acquisition of images of the patients included during the internship period.

**3-5 recent publications :**

- Goadsby P. Pathophysiology of cluster headache: a trigeminal autonomic cephalgia. *The Lancet Neurology*. 2002;1(4):251-257
- May A, Schwedt T, Magis D, Pozo-Rosich P, Evers S, Wang S. Cluster headache. *Nature Reviews Disease Primers*. 2018;4:18006
- Hoffmann J, May A. Diagnosis, pathophysiology, and management of cluster headache. *Lancet Neurol*. 2018;17:75-83
- Giraud P, Demarquay G. Algie vasculaire de la face : place de l'imagerie. *Presse Med*. 2015 Nov;44(11):1185-7. PMID: 26585270
- Courault P, Demarquay G, Zimmer L, Lancelot S. Cluster headache: state of the art of pharmacological treatments and therapeutic perspectives. *Fundam Clin Pharmacol*. 2021 Jun;35(3):595-619.
- Courault P, Mérida I, Costes N, Redouté J, Zimmer L, Lancelot S. (2025). PET imaging of functional 5-HT1A receptors with [18F]F13640: From PET kinetics modeling to static Standardized Uptake Values Ratio. *NeuroImage*.
- C Fauchon, S Corvin, I Faillenot, H Patural, D Reby, et al.. Parenting and empathy capabilities drive brain response to pain cues in baby cries. *Pain*, 2026