

MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2025-2026

(internship from January to June 2026)

Host laboratory:

Centre de Recherche en Neurosciences de Lyon
 Inserm U1028 - CNRS UMR5292 - UCBL
 Centre Hospitalier Le Vinatier - Bâtiment 462 - Neurocampus
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Host team :

PATHPARK (<https://www.crn.fr/fr/equipe/pathpark>)

Internship supervisors :

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Project title :

Investigating the role of the noradrenergic system in Parkinson's disease.

Project summary :

The goal of the project is to provide a wider understanding of the role of the noradrenergic system in the pathophysiology of Parkinson's disease (PD) through the use of a highly selective α_2 -adrenoceptors (ARs) PET radiotracers (namely the ^{11}C -ORM-13070) combined with a cutting-edge technology, the hybrid PET/MRI scanner. Although our latest study has evidenced the impact of locus coeruleus neuronal loss and α_2 -ARs reduced density on motor and non-motor symptoms in PD (Laurencin et al., 2024), these discoveries only provides a global picture of the NE system. The critical issue is now to be able to differentiate the effects on PD pathology of the different α_2 -ARs subtypes with a greater urgent interest in the main suspect $\alpha_2\text{C}$. The results of this project should fill this gap. Indeed, it aims to characterize $\alpha_2\text{C}$ -ARs deficiencies that may account for the behavioral manifestations of PD, including olfactory, cognitive and affective dysfunctions.

Recent publications :

- 1 Laurencin C, Lancelot S, Brosse S, Mérida I, Redouté J, Greusard E, Lamberet L, Liotier V, Le Bars D, Costes N, Thobois S, Boulinguez P, **Ballanger B. (2024)** Noradrenergic alterations in Parkinson's disease: a combined [^{11}C]yohimbine PET/neuromelanin study. *Brain*. 147(4):1377-1388.
- 2 Laurencin C, Lancelot S, Mérida I, Costes N, Redouté J, Le Bars D, Boulinguez P, **Ballanger B. (2023)** Distribution of α_2 -Adrenergic Receptors in the Living Human Brain Using [^{11}C]yohimbine PET. *Biomolecules*. 13, 843.
- 3 Criaud M, Laurencin C, Poisson A, Metereau E, Redouté J, Thobois S, Boulinguez P, **Ballanger B. (2022)** Noradrenaline and movement initiation disorders in Parkinson's disease: a pharmacological functional MRI study with clonidine. *Cells* 11:2640.
- 4 Criaud M, Poisson A, Thobois S, Metereau E, Redouté J, Ibarrola D, Baraduc P, Broussolle E, Strafella AP, **Ballanger B, Boulinguez P. (2016)** Slowness in Movement Initiation is Associated with Proactive Inhibitory Network Dysfunction in Parkinson's Disease. *Journal of Parkinson Disease* 6(2):433-40.