

**MASTER 2 Neurosciences Fondamentales et Cliniques**  
**UCB Lyon 1, Lyon, France**

**Internship proposal 2020-2021**  
**(internship from January to end of May 2021)**

**Host laboratory:**

Centre de Recherche en Neurosciences de Lyon  
Inserm U1028 - CNRS UMR5292 - UCBL  
Centre Hospitalier Le Vinatier - Bâtiment 462 - Neurocampus  
95 boulevard Pinel  
69675 Bron Cedex

**Host team :**

Neuropathology and Neuroplasticity of Olfactory Perception (Neuropop)

**Internship supervisors :**

Benedicte Ballanger, Chargée de Recherche CNRS, benedicte.ballanger@cnrs.fr

**Project title :** *Investigating the noradrenergic system in the living human brain across the life span : its role on perceptual and motor olfactory capacities*

**Project summary :**

Investigations of the noradrenergic system function in the brain have mainly been emerged from animal studies so far. Nevertheless, *in vivo* imaging of the noradrenergic system has recently become feasible with the development of a selective novel PET radiotracer:  $^{11}\text{C}$ -Yohimbine (Nahimi et al., 2015). This represents a tremendous and unique opportunity towards the collection of missing data in the living human brain by direct quantification of regional  $\alpha 2$ -adrenoceptors ( $\alpha 2$ -ARs) availability. So far, healthy aging has been associated with structural, functional and biochemical changes. Noradrenergic mechanisms have also been implicated (Docherty, 2002 for review). ***However, the in vivo evidence from human research of the role of noradrenaline (NA) is scant and exactly how normal or typical aging affects the locus coeruleus (LC) network, which provides the primary noradrenergic inputs to the cerebral cortex, is still very scarce.*** Accordingly, the goal of this research proposal is to provide, for the first time in humans, a wider understanding of the role of the LC-NA system through the use of the newly developed radiotracer visualizing  $\alpha 2$ -ARs combined with a cutting-edge technology, the hybrid PET/MRI scanner. During this internship, the applicant will take part in the inclusion of healthy volunteers, olfactory screening of those subjects, analyzing behavioral and imaging results.

**3-5 recent publications :**

Nahimi A, Jakobsen S, Munk OL, et al (2015) Mapping  $\alpha 2$  Adrenoceptors of the Human Brain with  $^{11}\text{C}$ -Yohimbine. *Journal of Nuclear Medicine*, 56(3), 392–398.  
Doty RL, Kamath V (2014) The influences of age on olfaction: a review. *Front Psychol* 5:20.  
Waterhouse BD, Navarra RL. The locus coeruleus-norepinephrine system and sensory signal processing: A historical review and current perspectives. *Brain Res*. 2019 Apr 15;1709:1-15.

Please send your proposal to [emiliano.macaluso@univ-lyon1.fr](mailto:emiliano.macaluso@univ-lyon1.fr) and [marion.richard@univ-lyon1.fr](mailto:marion.richard@univ-lyon1.fr) for publication on the website.