PhD Internship offer
Immunopsychiatrie et Neurosciences
Centre Hospitalier le Vinatier

Date of the offer: 05/15/2024

Host Lab: Institute of Cognitives Sciences Marc Jeannerod-ISCMJ

(CNRS-UMR 5229)

Team Leader: Pr. Caroline Demily, cheffe du Pôle ADIS et CRMR GénoPsy, CH Le Vinatier, Coordinnatrice du Centre d'Excellence Autisme iMIND

Supervisors: Pr. Caroline Demily et Amélie Soumier, chargée de recherche

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Languages spoken in the lab : English and French

Conditions : A 3-year PhD thesis allocation in neuroscience and psychiatry funded by the Centre Hospitalier Le Vinatier (Psychiatrie Universitaire Lyon Métropole) is available (September 2024) within the iMIND & Disorders of the Brain team, under the co-direction of Pr. Caroline Demily and Amélie Soumier, at the Institute of Cognitive Sciences Marc Jeannerod (ISCMJ-Bron). The doctoral grant awarded by CH Le Vinatier is part of a wider project to support and promote research in psychiatric disorders.

Research project title: Deciphering the role of oxytocin in inflammatory responses associated with neurodevelopmental disorders

Keywords **:** immunopsychiatry, neuroendocrinology, neurodevelopmental disorders, autism, three-dimensional cellular imaging, brain-body interaction, fundamental research, community-based participatory research

Project description (subject and technics) : While the genetic basis of neurodevelopmental disorders is beginning to be understood, the underlying biological mechanisms have yet to be elucidated. Numerous studies have shown that dysfunction of the oxytocin system-a neurohormone essential for regulating social behavior-caused by particular genetic variations, can increase the risk of developing disorders such as autism, depression or anxiety disorders. These findings have led to the development of intranasal oxytocin administration as a potential treatment. However, conflicting results suggest that oxytocin supplementation may not be a generic treatment for all individuals, but only for a fraction of them, underlying the need for further studies to clarify the impact of other variables such as immune status on the response of the oxytocin system. Indeed, early immune dysfunction and excessive inflammation are key features of disorder severity.

In this project, we seek to determine if, how and when social-emotional deficits are underpinned by abnormalities of the oxytocinergic system in association with neuro-immune cells, using a multidimensional and interdisciplinary approach combining three-dimensional

cellular RNA and protein imaging (by light sheet microscopy) with transcriptomic analysis (by RNA sequencing) on the brain and peripheral system in preclinical models. This translational research project lies at the interface between basic and clinical research, with the aim of devising new methods to explore the consequences of oxytocinergic system dysfunction on immune cell response and socio-emotional behavior. The program also involves a participatory research approach, working closely with those directly concerned by neurodevelopmental disorders and autism to better understand and exploit research findings.

This thesis work includes experimental design and data collection, statistical data analysis and the writing of progress reports as well as scientific articles. Interested candidates should contact amelie.soumier@isc.cnrs.fr with a CV and a cover letter. **The starting date is September 2024.**

Lab publications or recommended review on the subject:

1. Soumier A, Lio G, Demily C. Current and future applications of light-sheet imaging for identifying molecular and developmental processes in autism spectrum disorders. Mol Psychiatry. 2024 Mar 5. doi: 10.1038/s41380-024-02487-8. Epub ahead of print. PMID: 38443634.

2. Soumier A, Habart M, Lio G, Demily C, Sirigu A. Differential fate between oxytocin and vasopressin cells in the developing mouse brain. iScience. 2022;25:103655.

3. Habart M, Lio G, Soumier A, Demily C, Sirigu A. An optimized iDISCO+ protocol for tissue clearing and 3D analysis of oxytoc and vasopressin cell network in the developing mouse brain. STAR Protoc. 2023;4:101968.

4. Ellul P, Maruani A, Vantalon V, Humeau E, Amestoy A, Anchordoqui A, Atzori P, Baleyte JM, Benmansour S, Bonnot O, Bouvard M, Cartigny A, Coulon N, Coutelle R, Da Fonseca D, Demily C, Givaudan M, Gollier-Briant F, Guénolé F, Koch A, Leboyer M, Lefebvre A, Lejuste F, Levy C, Mendes E, Robert N, Schroder CM, Speranza M, Zante E, Peyre H, Rosenzwajg M, Klatzmann D, Tchitchek N, Delorme R. Maternal immune activation during pregnancy is associated with more difficulties in socio-adaptive behaviors in autism spectrum disorder. Sci Rep. 2023 Oct 17;13(1):17687. doi: 10.1038/s41598-023-45060-z. PMID: 37848536; PMCID: PMC10582088.

5. Docagne F, Spire B, Demily C, Barthelemy C. Recherche participative en psychiatrie et santé mentale. EMC Psychiatrie, 197 vol 21-1, 2024.