Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2025-2026

Laboratory/Institute: Institut of Functionnal Genomics **Director: Dr Philippe Marin**
Team: Neuroreceptors, dynamics and functions **Head of the team: Dr Philippe Rondard**

Name and status of the scientist in charge of the project: Dr Anaïs Menny, permanent researcher

HDR: yes ☒ no ☐

Address: 141 rue de la Cardonille, 34090 MONTPELLIER
Phone: 04 34 35 92 78 **e-mail:** anais.menny@igf.cnrs.fr

Program of the Master's degree in Biology:

☐ Microbiology, Infectious Diseases and Immunology ☒ Biochemistry & Structure
☐ Physiology, Epigenetics, Differentiation, Cancer ☒ Neurosciences and Neurobiology

Title of the project: In-situ characterization of GPCR complexes

Objectives (up to 3 lines):

The internship will be aimed at generating cell-derived vesicles containing the a GPCR complex for its in-situ structural characterization[3]

Abstract (up to 10 lines):

G-protein-coupled receptors are the largest family of membrane proteins in humans and are thus very important targets for drug developments. They typically function as individual signalling units, but can also interact with other GPCRs to form complexes called "heteromers." These heteromers have functional properties different from those of individual receptors.Understanding how heteromers function and assemble is of great therapeutical importance as they are involved in various pathologies. Notably, my group studies a heteromer implicated in psychosis in humans. And despite its first identification over a decade ago, the environmental conditions that favour this complex's assembly remain open question. Using different FRET sensors[1], including conformation-specific nanobodies[2], we have obtained exciting results showing how different lipid species markedly impact individual receptors and their ability to interact. Our next goal is to solve the structure of this complex using single-particle cryoEM in a preserved membrane environment.

Methods (up to 3 lines):

Cell-derived vesicles will be produced and characterised using SDS gels/western blots as well as biophysical approaches (DLS, FRET). The project also includes molecular biology, measure of complex assembly at the membrane via FRET and, depending on the progression, imaging the vesicles using electron microscopy.

Up to 3 relevant publications of the team:

1. Delgado, D. M. et al. Pharmacological evidence for a metabotropic glutamate receptor heterodimer in neuronal cells. Elife 6, (2017).
2. Meng, J. et al. Nanobody-based sensors reveal a high proportion of mGlu heterodimers in the brain. Nature Chem Biol (2022).
3. Tao, X. et al. Membrane protein isolation and structure determination in cell-derived membrane vesicles. PNAS (2023).

Requested domains of expertise (up to 5 keywords):

Biochemistry ; Structural Biology