

**Master 2 internship project
Year 2024-2025**

Laboratory/Institute: Biosanté U1292 INSERM-CEA-UGA
Team: MAB2

Director: Dr. A Andrieux
Head of the team: Dr N Alfaidy

Name and status of the scientist in charge of the project: Dr C. Marquette DR CEA

HDR: yes no

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Program of the Master's degree in Biology:

- Microbiology, Infectious Diseases and Immunology Structural Biology of Pathogens
 Physiology, Epigenetics, Differentiation, Cancer **Neurosciences and Neurobiology**

Title of the project: Characterization of metal-based agents for specific amyloid imaging in Alzheimer's disease and type 2 diabetes.

Objectives: The objectives of the M2 project will be to characterize innovative imaging probes against intrinsically linked A β -amyloids and amylin-amyloids involved in Alzheimer disease and in type 2 Diabetes.

Abstract: Amyloid aggregates are associated with numerous pathologies, such as Alzheimer's disease, with Abeta fibres located in the brain, or type 2 diabetes, with amylin fibres in the islets of Langerhans. Recently, a link between these two diseases has been demonstrated, probably via cross-seeding processes in which the aggregation of one peptide causes that of the other. As part of an ANR project, metal complexes selective for amylin vs Abeta have been generated with a view to exploiting them as medical imaging agents for the selective visualization of these peptides in the brain and pancreas.

Methods: These objectives will be addressed by studying probe recognition and binding on brain and pancreas sections from mice of each disease ex vivo by immunohistochemistry. This will be complemented by in situ probe- β -amyloid interaction analysis, following probe injection, using the 3DISCO method to obtain 3D images for high spatial resolution studies.

Relevant publications

- 1- J Pansieri et al, Multimodal imaging Gd-nanoparticles functionalized with Pittsburgh compound B or a nanobody for amyloid plaques targeting. *Nanomedicine* 2017, 12, 1675. doi: 10.2217/nnm-2017-0079
- 2- Lacerda et al. Metal complexes for multimodal imaging of misfolded protein-related diseases. *Dalton Trans.* 2017 Oct 31;46(42):14461-14474. doi: 10.1039/c7dt02371e.
- 3- Majdoub et al. Concentration-Dependent Interactions of Amphiphilic PiB Derivative Metal Complexes with Amyloid Peptides A β and Amylin. *Chemistry*. 2021 Jan 26;27(6):2009-2020. doi: 10.1002/chem.202004000..

Requested domains of expertise:

The candidate will be a highly motivated M2 student with a background in neuroscience/immunohistology/biochemistry/animal experimentation and strong analytical and organisational skills. Certification in animal experimentation will be an additional asset to the application. He/she will be able to work both independently and as part of a team, in particular with the engineer working on this project.

Interested candidates should send their CV, a cover letter (detailing motivation, relevant experiences and availability), and contact information for at least one reference to Christel Marquette: christel.marquette@cea.fr by October 15th, 2024.