UFR de Chimie et de Biologie
UNIVERSITÉ Grenoble Alpes

**Master's degree in Biology – Chemistry-Biology Department**

# Master 2 internship project
# Year 2024-2025

**Laboratory/Institute: Grenoble Institut Neurosciences** **Director:** Emmanuel Barbier
**Team: Neurocytoskeleton dynamics and structure** **Head of the team:** Isabelle Arnal

**Name and status of the scientist in charge of the project:** Anne Fourest-Lieuvin, PhD, DR
**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:**

## Exploring the role of tau in cell migration: interactions between tau, the cytoskeleton and focal adhesions

Objectives (up to 3 lines):

Our objective is to decipher how pathological tau induces focal adhesion defects via the disruption of microtubule and actin networks, mechanisms involved in tumor progression

Abstract (up to 10 lines):

Tau, a microtubule and actin regulator, plays a key role in neurodegenerative diseases. In many cancers, tau undergoes abnormal modifications, and this dysregulation is often associated with metastasis. Strikingly, recent studies have highlighted a link between the focal adhesion pathway and tau dysfunctions. To explore the hypothesis that altered tau induces focal adhesion defects via the disruption of microtubule and actin networks, cells expressing normal or pathological tau proteins will be seeded on micro-patterns which enables to standardize the organization of the cytoskeleton and focal adhesions. We will thus determine how microtubule and actin modifications induced by tau proteins alter the turnover of focal adhesions. Results will be correlated with the effects of tau proteins on cell migration, investigated by live-imaging experiments.

Methods (up to 3 lines):

Cell culture and patterning, transduction with lentiviral vectors, live-imaging using spinning confocal microscopy, immunofluorescence, Airyscan confocal microscopy, quantitative image analysis (ImageJ software)

Up to 3 relevant publications of the team:

- Fourest-Lieuvin et al. (2023) Controlled Tau Cleavage in Cells Reveals Abnormal Localizations of Tau Fragments. *Neuroscience* 518:162-177.
- Prezel et al. (2018) Tau can switch microtubule network organizations: from random networks to dynamic and stable bundles. *Mol Biol Cell* 29:154-165.
- Ramirez-Rios,et al. (2016). Tau antagonizes EB tracking at microtubule ends through a phosphorylation-dependent mechanism. *Mol Biol Cell*. 27:2924-34.

Requested domains of expertise (up to 5 keywords):

Cellular and molecular biology, optical microscopy, English, statistics.