



Master Biologie Moléculaire et Cellulaire 'BMC',
Université Paris Cité - UFR Sciences du Vivant

Parcours : **Biologie et Développement Cellulaires 'BDC'**

<http://www.master2bdc.fr/>

Fiche de Projet de Stage de M2, 2022-2023

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Intitulé Equipe : Controlling Microtubule Dynamics and Function with the tubulin code	Contacts Adresse : Bat 110, Centre Universitaire, 91401 Orsay
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Titre du projet : Mechanisms controlling microtubule diversity and functions

Résumé du Projet de Stage (en 300 mots maximum, mots clés en gras)

We are a team of **microtubule** enthusiasts aiming at understanding how microtubules adapt to many different functions in living cells. We use an **interdisciplinary approach** to understand how microtubules are regulated at the molecular level to control their functions in cells, and how this contributes to organism homeostasis. This will tell us how dysfunctions of these **mechanisms lead to disease**, such as neurodegeneration, cancer, or male infertility. We recruit creative and enthusiastic students motivated for interdisciplinary research. Candidates will be given the opportunity to design their own master projects based on their interests. During their internship, candidates will receive close guidance from experienced researchers of our team, and will also interact with international collaborators.

Which projects are currently ongoing in our lab

Our lab offers projects in the domains of biology, developmental biology and biochemistry.

1. Molecular control of microtubule interactions with associated proteins (MAPs) – cytoskeletal architecture.
2. Polyglutamylation in neuronal development and function - neurodegeneration.
3. Glycylation in ciliary function and flagellar beating – male fertility.
4. The impact of tubulin mutations on microtubule mechanics, dynamics and functions – neurodevelopmental disorders.

Which techniques are used

Students acquire up-to-date technical expertise, learn to independently design experiments, and will be trained in communication skills during our weekly lab meetings. Successful master students will be able to apply for a PhD studentship to pursue their work in our team. Our team has expertise in a range of modern experimental techniques, such as • Molecular cloning and protein expression in mammalian cells; • Lentivirus-mediated gene delivery, • Protein purification, biochemistry, • In vitro reconstitution assays and TIRF microscopy, • CRISPR-Cas9 gene engineering, • Cell biology (including primary cell culture); live-cell imaging with spinning disk microscopy; long-term imaging with Incucyte, • Mouse biology, histology

Publications de l'équipe relatives au projet de stage (max 5)

- Jijumon AS et al. (2022) Lysate-based pipeline to characterize microtubule-associated proteins uncovers unique microtubule behaviours. *Nat Cell Biol* **24**: 253–267
- Bodakuntla S et al. (2021) Distinct roles of alpha- and beta-tubulin polyglutamylation in controlling axonal transport and in neurodegeneration. *EMBO J* **40**: e108498
- Gadadhar S et al. (2021) Tubulin glycylation controls axonemal dynein activity, flagellar beat, and male fertility. *Science* **371**: eabd4914
- Janke C, Magiera MM (2020) The tubulin code and its role in controlling microtubule properties and functions. *Nat Rev Mol Cell Biol* **21**: 307-326