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

Parcours : **Biologie et Développement Cellulaires 'BDC'**
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Fiche de Projet de Stage de M2, 2023-2024

Unité INSERM ou CNRS ou Université : CNRS UMR7592/Université Paris-Diderot **Intitulé Equipe :** Biogenèse et polarité des centrioles et des cils **ED d'appartenance :** Bio SPC **Responsable de l'Equipe :** Juliette Azimzadeh	**Responsable du Stage :** Juliette Azimzadeh **Contacts** Adresse : Institut Jacques Monod CNRS/Université Paris Cité 15, rue Hélène Brion 75013 Paris https://azimzadeh-lab.cnrs.fr Email : juliette.azimzadeh@ijm.fr Tel : 01 57 27 81 13

Titre du projet : Investigating centriole linkage remodeling during the formation of a primary cilium

Résumé du Projet de Stage

Centrioles are involved in essential processes such as cell division, migration and cell-to-cell communication. As components of the centrosome, centrioles help organize the microtubule cytoskeleton. Centrioles are also necessary for the assembly of cilia: primary cilia, the sort of cellular antennae present on most of our cells for intercellular communication, or motile cilia essential for respiratory tract function. Abnormalities in the structure of centrioles are associated with cancer and genetic diseases called ciliopathies, which affect a multitude of organs.

Using a recent super-resolution imaging technique called expansion microscopy, we discovered an unexpected property of centrioles present at the base of primary cilia, rotational asymmetry (Gaudin et al., 2022). This results from the asymmetric localization of certain centriolar proteins within the centrioles. These results shed new light on the architecture of these centrioles, and pave the way for exploring the impact of this property on the organization of the cytoskeleton and the function of primary cilia in development.

The aim of the project is to determine the molecular architecture of an asymmetric linker connecting centrioles in cells forming a primary cilium, which we think facilitates cilium assembly and functioning. To this end, we will use expansion microscopy in combination with other super-resolution microscopy approaches (STORM, STED), as well as molecular biology (CRISPR/Cas9, RNAi) approaches in a model of human culture cells. We will also seek to determine the importance of this linker for the function of the cilium in developmental processes. For this, we will use a model of brain organoids derived from human induced pluripotent stem cells, the brain being an organ particularly affected by cilium anomalies.

Publications de l'équipe relatives au projet de stage

- Gaudin N., Martin Gil P., Boumendjel M., Ershov D., Pioche-Durieu C., Bouix M., Delobelle Q., Maniscalco L., Phan T.B.N., Heyer V., Reina-San-Martin B., Azimzadeh J. (2022). **eLife,** 11:e72382. doi 10.7554/eLife.72382.
- Le Guennec M., Klena N., Gambarotto D., Laporte M., Tassin A.M., van den Hoek H., Erdmann P.S., Schaffer M., Kovacik L., Borgers S., Goldie K.N., Stahlberg H., Bornens M., Azimzadeh J., Engel B., Hamel V., Guichard P. (2020). **Science advances**, Vol. 6, no. 7, eaaz4137. doi: 10.1126/sciadv.aaz4137.
- Pizon V., Gaudin N., Poteau M., Cifuentes-Diaz C., Demdou R., Heyer V., Reina San Martin B., Azimzadeh J. (2020). **Biology of the Cell**, 112(1):22-37. doi: 10.1111/boc.201900038.
- Basquin C., Ershov D., Gaudin N., Vu H.T.K., Louis B., Papon J.F., Orfila A.M., Mansour S., Rink J.C., Azimzadeh J. (2019). **Developmental Cell**, 51:516-25. doi: 10.1016/j.devcel.2019.10.021.