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, 2025-2026

Unité INSERM ou CNRS ou Université : Institut Pasteur -CNRS UMR3691 **Intitulé Equipe : Trafic Membranaire et Division Cellulaire** **ED d'appartenance : Complexité du Vivant** **Responsable de l'Equipe : Arnaud Echard**	**Responsable du Stage : Arnaud Echard** **Contacts** Adresse : Institut Pasteur 28, rue du Dr. Roux, 75015 Paris Email : arnaud.echard@pasteur.fr Tel :0144389409

Titre du projet : How cells split into two? Characterization of new proteins essential for cell division and ciliogenesis.

Résumé du Projet de Stage

Our lab is interested in cytoskeleton and membrane remodeling in human cell division, focusing on **cytokinesis**. This topic is highly relevant in **cancer biology**, since recent evidence actually shows that cytokinesis failure can contribute to 40%-60% of human tumors.

We previously identified and characterized the role of the oncogenic Rab GTPase Rab35 and partners in cytokinesis and revealed the first connection between oxidoreduction and cell division, through local oxidation of F-actin. Using proteomic approaches, we recently identified a number of promising proteins highly concentrated in the midbody, the central part of the cytokinetic bridge which is a platform for abscission (Addi et al. Nature Communications 2020). We have now completed similar analysis in primary progenitor cells (unpublished), which now gives us the opportunity **to identify core proteins involved in abscission**. This revealed the presence of numerous proteins regulating **actin and cytoskeleton dynamics** as well as, unexpectedly, proteins concentrated at the midbody and previously involved in the **formation of primary cilia, whose defects leads to many human ciliopathies**.

The aim of this project is to characterize the localization and functional contribution of a selection of these candidates in abscission using **genome editing** and **state-of-the-art live human cell imaging**. Potential roles in both **cytokinesis and ciliogenesis** will be further studied after depletion of the candidate proteins using **RNA interference** or **CRISPR-Cas9 strategies**. To explain the potential functional defects, the dynamics of the ESCRT-III proteins composing the abscission machinery will be analyzed in detail. This work should identify new mechanisms essential for the terminal step of cell division and reveal potential new parallels between cytokinesis and ciliogenesis.

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

***= PhD students = first authors**

1- Nature Communications 2024 PMID: 32029597
2- Developmental Cell 2023 PMID: 37875118
3*- Nature Communications 2020 PMID: 32321914
4*- Science Advances 2022 PMID: 35417244
5*- Current Biology 2021 PMID 33711249

see also https://research.pasteur.fr/en/team/membrane-traffic-and-cell-division/