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

Parcours : **Biologie et Développement Cellulaires 'BDC'**
http://www.master2bdc.fr/
Fiche de Projet de Stage M2, Année 2020-2021

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 : Stéphane Frémont** **Contacts** Adresse : Institut Pasteur 28, rue du Dr. Roux, 75015 Paris Email : stephane.fremont@pasteur.fr Tel :0144389410

Titre du projet :

Discovering new essential mechanisms common for cell division and budding of enveloped viruses

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

Our lab is interested in **cytoskeleton** and membrane remodeling in human cell division, focusing on **cytokinesis**. Although cytokinesis has fascinated scientists for more than 150 years, the terminal step of cell division (named abscission) is still poorly understood. Intriguingly, cytokinesis presents many interesting parallels with the budding of envelopped viruses (like HIV, Human Immunodeficiency Virus) from infected cells. Indeed, the **budding of HIV-1** from the plasma membrane and the abscission step of cytokinesis involve similar membrane scission events. A major advance in the last decade came from discovery of the central role of the ESCRT (Endosomal Sorting Complex Required for Transport) machinery, both for HIV-1 budding and cytokinesis. **The originality of this project is to reveal additional parallels between cytokinesis and HIV-1 budding.**

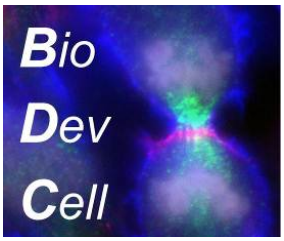
Using proteomic approaches, we recently identified a number of promising proteins highly concentrated in the midbody, a structure present in the central part of the intercellular bridge and that recruits the factros essential for the physical abscission of the two daughter cells (Ref. 1).

The aim of this project is to characterize the localization and functional contribution of these candidates in both cytokinesis and HIV-1 budding. Our research is based on **cell biology** and functional approches, using cutting edge **genome editing**, **fluorescence imaging** (spinning disk confocal microscopy, TIRF microscopy, photoconversion, super-resolution), **electron microscopy** and **live cell imaging**.

Researches both on cytokinesis and HIV budding are highly relevant for human health. Indeed, more than 30 millions people worldwide are infected by HIV (ONUSIDA 2018), and recent evidence actually shows that 40% of human tumors might result from cytokinesis defects.

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

1-The Flemmingsome reveals an ESCRT-to-membrane coupling via ALIX/syntenin/syndecan-4 required for completion of cytokinesis. Addi *et al.,* **Nature Commununications 2020** PMID:32321914
2-Actin reduction by MsrB2 is a key component of the cytokinetic abscission checkpoint and prevents tetraploidy. Bai *et al.,* **PNAS 2020** PMID:32029597
3-Membrane Traffic in the Late Steps of Cytokinesis. Frémont *et al.,* **Current Biology 2018** PMID:29689230
4-Oxidation of F-actin controls the terminal steps of cytokinesis. Frémont *et al.,* **Nature Comunications** 2017 PMID:28230050
5- Engulfment of the midbody remnant after cytokinesis in mammalian cells. Crowell *et al.,* **Journal Cell Science** 2014 PMID:25002399



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