Funded PhD on **Novel Functions of Branched Actin Networks**

in the team of **Alexis Gautreau (Ecole Polytechnique/CNRS, Palaiseau)**
https://portail.polytechnique.edu/bioc/en/recherche/alexis-gautreau

Funded for 3 years. Deadline to apply Nov 15, 2022.
Supervision by Anna Polesskaya (CNRS Staff Researcher)
and Alexis Gautreau (CNRS Research Director)
Tight collaboration with the group of Roberto Dominguez (University of Pennsylvania, Philadelphia)

Project

The Arp2/3 complex is the machinery that exerts a pushing force in the cell, due to the branched actin it polymerizes. This force is well established to project the plasma membrane in cell migration and to remodel membranes in intracellular trafficking. The goal of this PhD is to uncover new Arp/3 functions and regulators. To this end, our lab has performed a bioinformatics screen that has revealed potential Arp2/3 partners. The PhD candidate will construct plasmids to knock-down, knock-out and screen these partners using a novel procedure that avoids isolating and characterizing stable clones that drift during the process.

The screen will involve imaging branched actin networks using various human cell lines expressing GFP tagged reporters of branched actin networks. The bioinformatics screen is likely to have uncovered Arp2/3 inhibitory proteins, whose inactivation should give rise to enhanced polymerization of branched actin. Depending on the observations, direct assays for functions where Arp2/3 activity is deregulated will be performed. Quantitative assays are already set-up in the lab for Arp2/3 activity at membrane protrusions (cell migration), at the surface of internal organelles (trafficking), or at cell-cell junctions (multicellular coordination of migration and proliferation). We would also be particularly interested to reveal nuclear functions, such as transcription, DNA repair and chromatin compaction, where Arp2/3 roles are suspected, but not well established…

This cell biology project will be performed in collaboration with a structural biochemist to uncover point mutations that specifically abolish Arp2/3 interaction. The knock-down/ knock-out phenotypes are expected to be rescued by WT, but not by mutant forms of the novel Arp2/3 regulators.

Technologies

Generation of knock-out and knock-in cell lines by CRISPR-Cas9
Live cell imaging
Quantitative analyses of cell behavior and protein dynamics

References

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Recent relevant manuscripts can be found on BioRxiv.