

Supervisor(s):

Name : FENDER Pascal

E-Mail Address : pascal.fender@ibs.fr

Name : GALLET Benoit & SCHOEHN Guy

E-Mail Address : benoit.gallet@ibs.fr; guy.schoehn@ibs.fr

Host laboratory:

Lab : IBS

Host group/team:

MEM/Adenovirus team

Title of the M2 research internship:

Visualization of adenoviral crystalline assemblies in the nucleus of infected cell using *in-situ* cryo-electron tomography

Project summary:

Adenoviruses are at the same time a pathogen and the most commonly viral vectors used in vaccination or as oncolytic viruses. While the main mechanisms of replication are fairly well documented, little is known about the assembly of these viruses in the nucleus of infected cells. Interestingly, all the viral capsomers are first synthesized in the cell cytoplasm 12-16h after infection before being transported to the cell nucleus, where final assembly takes place in less than 24h. A particular feature of these 90 nm-icosahedral viruses is that viral capsid and some viral capsomers crystallize in the cell nucleus ([10.1371/journal.pone.0002894](https://doi.org/10.1371/journal.pone.0002894)). Little is known on the formation of these paracrystalline organizations. With the installation of the new cryo-FIB-SEM at IBS, detailed imaging of viral infection is now conceivable by *in-situ* cryo-electron tomography ([10.1016/j.xpro.2022.101696](https://doi.org/10.1016/j.xpro.2022.101696)). The aim of the project will be to image, characterize and understand the formation of these nuclear superstructures for different human adenoviruses encoding GFP (Ad3-GFP; Ad5-GFP; Ad7-GFP). This translational project including also a correlative light electron microscopy approach (CLEM) combines the expertise in viruses of the “Adenovirus team” and that in electron microscopy of the “MEM” group, and is in line with Gral's objective of placing complex structure assemblies in a cellular context. The two teams have already worked together leading to over 15 joint publications. The M2 student will benefit of the complementary environment of our two teams and will have access to a cutting edge technology.

Keywords:

virus; nuclear assembly; cryo-FIB-SEM; cryo-tomography, intra-cellular crystals

Relevant publications of the team:

1. Vassal-Stermann, E.; Effantin, G.; Zubietta, C.; Burmeister, W.; Iseni, F.; Wang, H.; Lieber, A.; Schoehn, G.; Fender, P. CryoEM Structure of Adenovirus Type 3 Fibre with Desmoglein 2 Shows an Unusual Mode of Receptor Engagement. *Nature Communications* **2019**, *10*, doi:10.1038/s41467-019-09220-y.
2. Besson, S.; Vragliau, C.; Vassal-Stermann, E.; Dagher, M.C.; Fender, P. The Adenovirus Dodecahedron: Beyond the Platonic Story. *Viruses* **2020**, *12*, 718, doi:10.3390/v12070718.
3. Chevillard, C.; Amen, A.; Besson, S.; Hannani, D.; Bally, I.; Dettling, V.; Gout, E.; Moreau, C.J.; Buisson, M.; Gallet, S.; et al. Elicitation of Potent SARS-CoV-2 Neutralizing Antibody Responses through Immunization with a Versatile Adenovirus-Inspired Multimerization Platform. *Molecular Therapy* **2022**, *30*, 1913–1925, doi:10.1016/j.ymthe.2022.02.011.

4. Effantin, G.; Hograindleur, M.-A.; Fenel, D.; Fender, P.; Vassal-Stermann, E. Toward the Understanding of DSG2 and CD46 Interaction with HAdV-11 Fiber, a Super-Complex Analysis. *J Virol* **2023**, e00910-23, doi:10.1128/jvi.00910-23.