

INTERNSHIP PROPOSAL

Institute and Group: IBS-Schoehn Group-Fender team

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Research project title: [Design of a versatile cell delivery vehicle](#)

5 Keywords to describe the project:

Vectorisation – Therapeutic delivery – Biotechnology – Virus like particle - Applications

Description of the project (aims, experimental techniques, recommended background):

10 to 15 lines:

We have developed a cell delivery vehicle derived from viral capsomer assemblage. This vector efficiently enters the cell as virus does while being non-infectious. Up to now, this vehicle can carry average molecular weight cargo (from small peptide up to hundred amino-acids polypeptide). The goal of the present M2 project will be to overcome this size limitation and to deliver any kind of large protein using the same vehicle. To that goal, the M2 student will

take advantage of the natural interaction taking place between two adenoviral proteins (the penton base and the fibre protein). Since the vehicle is made of 12 penton bases interacting together, the protein to be delivered will be fused to the fibre sequence responsible for penton base docking. Other approaches such inserting in the vehicle a domain known to interact with the protein of interest will be also tested. Once the protein of interest will be delivered in the cell, the fate of this latter will be investigated by cellular imaging (Confocal analysis). This project will be a follow up study to a proof of concept developed thanks to the help of 'Valo Gral' and would represent a breakthrough in the currently used technology.

Justification that the internship's subject fits with the general theme of GRAL (3 lines):

As stated above, the starting point of the project was a 'Valo Gral' grant awarded in december 2014. The project typically cross the frontier between structure analysis, cellular biology and therapeutic application in agreement with the Gral policy.

Relevant publications of the team (3 max):

1. Villegas-Mendez, A. *et al.* In vivo delivery of antigens by adenovirus dodecahedron induces cellular and humoral immune responses to elicit antitumor immunity. *Mol. Ther. J. Am. Soc. Gene Ther.* **18**, 1046–1053 (2010).
2. Fender, P. Use of dodecahedron 'VLPs' as an alternative to the whole adenovirus. *Methods Mol. Biol.* **1089**, 61–70 (2014).
3. Sumarheni, Gallet, B & Fender, P. The Use of Adenovirus Dodecahedron in the Delivery of an Enzymatic Activity in the Cell. *Biotechnol. Res. Int.* **2016**, 5030589 (2016).