

INTERNSHIP PROPOSAL

Institute and Group: BIG/BCI/PBRC

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Research project title:

Study of the bacterial cooperation in cell intoxication by *Pseudomonas aeruginosa*

5 Keywords to describe the project:

Bacterial pathogenesis; Type III Secretion System; Exolysin A; automated microscopy;

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

10 to 15 lines:

Pseudomonas aeruginosa is a gram-negative opportunistic pathogen infecting cystic fibrosis patients and responsible for nosocomial diseases. Depending on the strains, its virulence mainly depends on either the Type III Secretion System or the newly described Exolysin A. Both pathogenesis mechanisms require a close contact between bacteria and the target cell but it is not known whether cell intoxication results from a collective action of bacteria or from an individual bacterium. The aim of this project is to investigate the cooperative versus individual “kiss of death” hypothesis. For this purpose cellular models of infection mainly based on automated microscopy will be employed with varying ratios of bacteria to eukaryotic cells and modulation of the amount of secreted toxins. Furthermore, bacteria will be lysed at different timepoints by using Polymixin B. The most innovative approach will be to monitor the infection of a single cell by 1 to 10 bacteria. Modelling of the data retrieved from the different infection kinetics will allow assessing cooperativity and bringing new temporal insights on cell infection. Applicants should have a background in microbial pathogenesis, cellular and bacterial culture, and experience in microscopy would be appreciated.

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

This project fits with the GRAL Axe 1 Host-pathogen interaction. Our team is dedicated to the study of the mechanisms of *P. aeruginosa* virulence for 20 years and the goal here is to understand it at the collective vs individual bacterial level.

Relevant publications of the team (3 max):

CLIQ-BID: A method to quantify bacteria-induced damage to eukaryotic cells by automated live-imaging of bright nuclei. Wallez Y, Bouillot S, Soleilhac E, Huber P, Attrée I, Faudry E. (2017). Sc. Reports. In press

Pseudomonas aeruginosa Pore-Forming Exolysin and Type IV Pili Cooperate To Induce Host



Grenoble Alliance for Integrated
Structural & Cell Biology

Cell Lysis. Basso P, Ragno M, Elsen S, Reboud E, Golovkine G, Bouillot S, Huber P, Lory S, Faudry E*, Attrée I*. (2017). MBio. Jan 24;8(1).

ExsB is required for correct assembly of the *Pseudomonas aeruginosa* Type III Secretion apparatus in the bacterial membrane and full virulence in vivo. Perdu C, Huber P, Bouillot S, Blocker A, Elsen S, Attrée I, Faudry E. (2015). Infect Immun. May;83(5):1789-98.