

**Master 2 internship project
Year 2021-2022**

Laboratory/Institute: IBS
Team: PBRC

Director: Winfried WEISSENHORN
Head of the team: Ina ATTRÉE

Name and status of the scientist in charge of the project: Eric FAUDRY **HDR:** yes no
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Program of the Master's degree in Biology:

- Immunology, Microbiology, Infectious Diseases Structural Biology of Pathogens
 Physiology, Epigenetics, Differentiation, Cancer Neurosciences and Neurobiology

Title of the project:

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

Objectives (up to 3 lines):

Understand the interaction between *P. aeruginosa* and the host cells at the single cell and single bacterial level. Explore a possible cooperativity between the bacteria.

Abstract (up to 10 lines):

Pseudomonas aeruginosa is a gram-negative opportunistic pathogen infecting cystic fibrosis patients and responsible for nosocomial diseases. Its cytotoxicity mainly depends either on the Type III Secretion System or on the pore-forming toxin ExlA. Despite advances in the comprehension of molecular mechanisms, the timing of cell intoxication and the cooperative versus individual "kiss of death" hypothesis remain to be thoroughly studied. To gain knowledge on these aspects, cellular models of infection mainly based on automated microscopy were previously developed by our team. They will permit employing varying ratios of bacteria to eukaryotic cells and modulating the amount of secreted toxins. 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.

Methods (up to 3 lines):

Cell infection by wild type and mutant strains
Automated microscopy
Cell confinement in micro-wells

Up to 3 relevant publications of the team:

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. (2018). Sc. Reports. 8(1):5

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

Pseudomonas aeruginosa Transmigrates at Epithelial Cell-Cell Junctions, Exploiting Sites of Cell Division and Senescent Cell Extrusion. Golovkine G, Faudry E, Bouillot S, Elsen S, Attrée I, Huber P. (2016). PLoS Pathog. 12(1):e1005377.

Requested domains of expertise (up to 5 keywords):

Microbial pathogenesis, cellular and bacterial culture. Experience in microscopy and R language would be appreciated.