EVRest team, Infection •Antimicrobiens • Modélisation • Evolution, UMR 1137, Inserm – Université Paris Cité – Université Sorbonne Paris Nord

Physical Microfluidics and Bioengineering team, Genomes and Genetics, Institut Pasteur

A 2-year post-doctoral position is open in the teams: EVRest and Physical Microfluidics and Bioengineering

The aim of this project is to combine cutting-edge microfluidic tools with fundamental microbiology to provide a new quantitative viewpoint on the response of bacteria to antibiotics.

PROJECT: Antibiotic tolerance and persistence occur when bacterial populations or sub-populations survive a bactericidal treatment for a longer duration without a resistance mechanism. The importance of single-cell heterogeneity in antibiotic tolerance and persistence pushes us to combine population and single-cell studies in conditions that mirror clinical contexts.

In this project we will encapsulate bacteria in microfluidic droplets and measure their killing with antibiotics. We will use lab and clinical isolates with or without fluorescence to adapt image analysis pipelines. Finally, we will develop a theoretical model to link the measured behavior in the microfluidic devices to population evolution. Manipulating these populations in the "anchored" microfluidic droplet format will allow us to finely tune the culture media and environmental conditions in time, which will allow us to question the interplay between the environment and genetics of the cells in determining their response to antibiotics.

As a result this project will address fundamental questions on bacterial tolerance, while helping improve single-cell technologies with a potential to provide fast bacterial diagnosis and antibiotics prescription in the clinic.

CANDIDATE PROFILE: We are looking for motivated, independent and dynamic candidate with solid experience in in one or more of the following topics: quantitative Biology, microfluidics, single-cell analysis, and antibiotic resistance. The ability to work in a highly multidisciplinary and international team is a strong prerequisite.

ABOUT THE HOST LABs: The Baroud lab is a multi-disciplinary team working on the interface between physical sciences, engineering, mathematical modeling, and applications of these fields to biological sciences. The lab has experience with measuring antibiotic response of bacteria in microfluidics.

El Meouche lab focuses on tolerance and resistance in clinical *E. coli* isolates in the context of urinary tract infections.

The post-doc will spend 50% if the time in each lab – Both PIs will participate in the supervision.

APPLICATION: Please, send applications including a statement of research interest, CV with names and contact information of 2 referees, to: **imane.el-meouche@inserm.fr** and **charles.baroud@pasteur.fr**

STARTING DATE: The position is available asap. Administrative paperwork generally takes two months. Salary will be commensurate to previous experience in line with the institution regulations.

PUBLICATIONS RELATED TO THE TOPIC:

Amoura, C. Pistien, C. Chaligne, S. Dion, M. Magnan, A. Bridier-Nahmias, A. Baron, F. Chau, E. Bourgogne, Minh Le, E. Denamur, M. Ingersoll, B. Fantin, A. Lefort and I. El Meouche. Variability in cell division among anatomical sites shapes *Escherichia coli* antibiotic survival in a urinary tract infection mouse model. *Cell Host & Microbe* (2024).

G. Amselem, C. Guermonprez, B. Drogue, S. Michelin, C. N. Baroud, Universal microfluidic platform for bioassays in anchored droplets. *Lab Chip*. 16, 4200– 4211 (2016).

L. Le Quellec, A. Aristov, S. G. Ramos, G. Amselem, J. Bos, Z. Baharoglu, D. Mazel, C. N. Baroud, Measuring single-cell susceptibility to antibiotics within monoclonal bacterial populations. *bioRxiv* (2023).