MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2025

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

ITQB NOVA

RESEARCH GROUP AND URL

Intracellular Microbial Infection Biology lab https://imiblab.com/

SUPERVISOR (NAME AND E-MAIL)

Pedro M. Pereira pmatos@itqb.unl.pt

SHORT CV OF THE SUPERVISOR

Intracellular Microbial Infection Biology (IMIB) group leader at Mostmicro ITQB NOVA; *GoogleScholar; ORCID; CienciaVitae; @MicrobeMatos*.bsky.social

I am a cell biologist with extensive scientific knowledge in microbiology, host-pathogen interaction, and advanced microscopy approaches. I have over 10 years' experience in scientific Project design/management, undergraduate and postgraduate student supervision and writing/communication of scientific information to both expert and non-expert audiences. To attest to this I am lead author in several high profile publications with over 4000 citations, I have co-supervised Master and PhD students, and have been actively involved in several outreach initiatives (e.g. In2Science, ITQB NOVA - open day, Academy of Sciences Young Researchers Seminary conference cycle: "How to dialogue with who does not want to listen: beyond polarization and disinformation"). I have served in several decision boards in Universidade Nova de Lisboa (NOVA), University College London (UCL) and the Francis Crick Institute (FCI) where I have worked with academic, industrial and political partners to define scientific and institutional vision and impact strategies (e.g. Mostmicro directive board). More recently I was selected for as a member of the Academy of Sciences Young Researchers Seminary. Experience that has provided me with a comprehensive view about research and the scientific endeavour. From a research point of view I have made significant contributions in the fields of *Staphylococcus aureus* cell biology (e.g. discovering a link between peptidoglycan and wall teichoic acids biosynthesis), host-pathogen interaction (e.g. importance of autolysins for immune evasion, or the role of septins in the recognition of intracellular pathogens), hardware, software and probe based technological innovations for microscopy (e.g. NanoJ-Fluidics, NanoJ-SRRF and Super-Beacons, respectively). I was awarded the prestigious "La Caixa" Junior Leader Fellowship and a FCT project grant to develop my independent research project in Portugal. Since October 1st 2021 I have my own research group at ITQB NOVA, Intracellular Microbial Infection Biology (IMIB) laboratory.

5 SELECTED PUBLICATIONS

- High-Priority Pathogens: Where Do We Stand?, ±Portela R, ±Klementina B, ±Costa MPC, Grilo R, Pereira PM*, Nanotherapeutics for Infectious Diseases, Jenny Stanford Publishing. (2025).
- PhotoFiTT: A Quantitative Framework for Assessing Phototoxicity in Live-Cell Microscopy Experiments, ±Del Rosario M, ±Gómez-de-Mariscal E, Morgado L, Portela R, Jacquemet G, Pereira PM*, Henriques R*, BioRxiv (2024).
- DeepBacs for multi-task bacterial image analysis using open-source deep learning approaches, Spahn C, Laine RF, Gómez-de-Mariscal E, Pereira PM , von Chamier L, Conduit M, Pinho MG, Jacquemet G, Holden S, Heilemann M, Henriques R, Communications Biology (2022).
- Super-Beacons: Open-Source Probes With Spontaneous Tuneable Blinking Compatible With Live-Cell Super-Resolution Microscopy, ±Pereira PM, ±Gustafsson N, Marsh M, Mhlanga MM, Henriques R, Traffic (2020).
- Teichoic acids are temporal and spatial regulators of peptidoglycan crosslinking in Staphylococcus aureus, ±Atilano ML, ±Pereira PM, Yates J, Reed P, Veiga H, Pinho MG, Filipe SR, PNAS (2010).

PROJECT TITLE AND SHORT DESCRIPTION

Super-Bug within: decoding host-persister interaction spatiotemporal dynamics

Bacterial infections are one of the most critical global health challenges, predicted to cause over 300 million deaths by 2050. A factor contributing to this forecast is bacterial persistence, wherein subpopulations of

bacteria enter a transient state of slow- or non-growth, becoming tolerant to antibiotics and evading host immune responses. *Staphylococcus aureus* (*S. aureus*), the leading global cause of death caused by antibiotic-resistant bacteria, can establish intracellular reservoirs of bacterial persisters in immune and non-immune cells. We propose that the transition of intracellular *S. aureus* into a persistent state while maintaining some metabolic activity represents a sophisticated survival strategy that has developed through host-pathogen co-evolution and contributes to chronic infections and antibiotic treatment failure. We hypothesise that this strategy is based on different host cell responses to persistent and non-persistent bacteria and is dependent on a molecular dialogue with infected host cells. In this project we aim to decode the complex molecular choreography of the host-persister interplay, uncover novel molecular pathways important for host-persister interactions and explore the potential of near physiological models of infection. This project is integrated in a research team, positioned at the intersection of biological discovery and technological innovation, uniquely equipped to provide novel insights into host-persister interactions. Understanding the molecular mechanisms governing these interactions will provide innovative strategies for targeting intracellular bacterial persisters, thereby addressing an important global health challenge.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Life Sciences (LIF)

***Scientific Area where the project fits best** – Please select/indicate the scientific area according to the panel evaluation areas: Chemistry (CHE) • Social Sciences and Humanities (SOC) • Economic Sciences (ECO) • Information Science and Engineering (ENG) • Environment and Geosciences (ENV) • Life Sciences (LIF) • Mathematics (MAT) • Physics (PHY)