BBSRC Strategic Research Priority
Molecules, Cells and Systems
  • Microbiology

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PhD project title: Investigating novel treatments for sepsis by understanding the pathogenesis of invasive infection.

University of Registration: Leicester

Project outline

1. Project outline describing the scientific rationale of the project (max 4,000 characters incl. spaces and returns)

We have recently discovered that bacteria, previously considered extracellular pathogens replicate within a subset of macrophages before causing invasive infection (Ercoli et al., Nature Microbiology 2018). This work is now extended to pathogens relevant for zoonotic and veterinary infections in addition to work on human pathogens. The observations that many bacteria replicate in a hidden and protected niche prior to disease is a game-changing observation as it may allow to design new treatment and prevention strategies which could have significant impact on health and wellbeing not only of humans but also of animals.

The work will address bacterial replication within the host, using ex vivo models and whole human organ perfusions (Chung et al., ALTEX 2018). This cutting-edge work on whole organs will be integrated with work on tissue cultures and primary cell cultures. Analysis will include confocal fluorescent microscopy, flow cytometry, and molecular methodologies. These approaches will require interdisciplinary training spanning from cell biology, microbiology, to next generation sequence analysis. In addition, the student will be introduced to methods necessary to perform the mathematical modelling of the bacterial fate during pathogenesis of infection.

The student will be integrated in a vibrant research group and we anticipate that the work will provide the student with a set of significant publications and a strong interdisciplinary training which should favour further academic work and employability.

For any further request of information please email the Pi MR Oggioni at mro5@le.ac.uk for discussion of the project or to be put in contacts with the other PhD students of the group for further information.

References:

Techniques that will be undertaken during the project

Biosafety level 2 microbiology techniques, cell culture, work on whole organs, organ slice cultures, confocal microscopy, flow cytometry and cell sorting, next generation sequencing and qPCR for gene expression analysis and mathematical modelling. These techniques map to multiple different fields spanning from Medicine, Animal work to Genetics, Cell Biology, Bioinformatics and Mathematics. This breadth of work will give the student excellent interdisciplinary skills.