

# Department of Veterinary Medicine

Available PhD Project:

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**Project Title:** How does inflammation impact on the efficacy of antibiotics in vivo?

**Description:** The aim of the project is to understand the reciprocal interactions between in vivo pathogen behaviour, host responses and antibiotic treatments within a mammalian host.

Antimicrobial therapy is not always successful and in some cases the pathogens can chronically persist in the host tissues resulting in carrier states that are difficult to eradicate. Difficulties in treating infection cannot be always ascribed to antimicrobial resistance genes. Drugs that are highly effective in vitro are less effective in vivo and the host-pathogen relationships behind these failures are still unclear. Difficulties to clear the infection are observed more frequently in patients with immunodeficiencies. This indicates that the success of antibiotic treatment often relies on the cooperation between drugs and immune effectors. However, immunity can be a double-edged sword as it can also pose limitations to the efficacy of some antibiotics by affecting the location and the division rates of bacteria.

Using cutting-edge technology, the project will reveal the precise changes in pathogen behavior that occur as a consequence of the manipulation of inflammatory responses in the course of antibiotic treatment. The work will gather information on the reciprocal interactions between antimicrobial treatment, host immune responses and behavior of individual bacterial subpopulations at the single cell level within the infected tissues. This will be achieved through a multidisciplinary approach that will integrate immunology, molecular biology, pharmacology and mathematical modeling and will therefore allow the acquisition of skills in several branches of infection biology.

The project will improve our understanding of how antibiotics work in those circumstances where inflammation and infection control are impaired and will also establish rational bases for combined antimicrobial-immunological treatment options.

## **Funding:**

This project is not funded. Prospective students would be expected to apply for funding opportunities either through the University (<http://www.vet.cam.ac.uk/grad/Prospectivestudents/funding>) or other sources.

## **How to apply:**

Contact the Supervisor to discuss before submitting an application – details here: <http://www.vet.cam.ac.uk/grad/Prospectivestudents/apply>