University College Dublin
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Project Details:	
Host Institution:	University College Dublin (UCD)
Location:	Belfield, Dublin 4, Ireland
College/Company:	College of Science
School/Unit:	School of Biomolecular and Biomedical Science
Website:	http://www.ucd.ie/sbbs/

Project Lead:	
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Project Title:

Determining the host response to novel vaccine antigens

Brief Project Description:

Antimicrobial resistance is a massive growing problem in the fight against bacterial infections. The number of antibiotics that are effective at treating many bacterial infections is shrinking. Vaccines represent one of the best ways to prevent bacterial infections and have also been shown to reduce antimicrobial resistance [1]. In our lab our aim is to develop anti-bacterial vaccines in order to prevent these difficult and challenging infections. We use a proteomic approach to identify highly effective vaccine antigens which prevent infections in mouse models. We have number of vaccine projects ongoing in our laboratory against antibiotic resistant infections such as respiratory infections that impact the lives of people with cystic fibrosis[2]; the tropical infection, melioidosis[3, 4]; O157 E. coli and two potentially lethal hospital acquired infections, Klebsiella pneumoniae and Acinetobacter baumannii [5]. We mapped the global prevalence of multidrug-resistant A. baumannii and showed that carbapenem-resistant A. baumannii is widespread throughout Asia and the Americas [5]. We have tested these vaccine antigens in mice and are currently examining the protective immunological responses, including antibody responses and cytokine responses in serum or immune cells. This project will focus on the vaccines for A. baumannii. It will involve using ELISA to determine the levels of antigen specific IgGs in immunised mice. In addition the host response will be further examined by exposing immune cells to antigen and evaluating the profile of cytokines produced using flow cytometry and/ or ELISA. Understanding how the antigens protect against infection is an important stage in progressing the vaccines towards human trials.

The project would suit someone with an interest in immunology, microbiology or biochemistry.

References:

1. Mishra RP, Oviedo-Orta E, Prachi P, Rappuoli R, Bagnoli F. Vaccines and antibiotic resistance. Curr Opin
Microbiol 2012; 15:596-602.
2. McClean S, Healy ME, Collins C, et al. Linocin and OmpW Are Involved in Attachment of the Cystic Fibrosis-Associated Pathogen Burkholderia cepacia Complex to Lung Epithelial Cells and Protect Mice against Infection.
Infection and immunity 2016; 84:1424-37.
3. Casey WT, McClean S. Exploiting molecular virulence determinants in burkholderia to develop vaccine antigens. Curr Med Chem 2015; 22:1719-33.
4. Casey WT, Spink N, Cia F, et al. Identification of an OmpW homologue in Burkholderia pseudomallei, a protective vaccine antigen against melioidosis. Vaccine 2016; 34:2616-21.
5. Ma, C., & McClean, S. (2021). Mapping Global Prevalence of Acinetobacter baumannii and Recent Vaccine Development to Tackle It. Vaccines, 9(6), 570.

Project Dates:

From the end of May to August (specific dates and weekly hours can be agreed between the PI and the student directly over a 10-week period).

Candidate Requirements:

The project would suit someone with an interest in immunology, microbiology or biochemistry - a strong academic background required.