EPSRC Centre for Doctoral Training (CDT) in Molecular Sciences for Medicine (MoSMed)

New Detection technologies for emerging infectious diseases

Durham University/Newcastle University

Supervisory Team	• **Prof Ehmke Pohl, Durham University (Lead Supervisor) Prof Matthias Trost, Newcastle University (Co-supervisor)**

Project overview/context

The ongoing Covid19 pandemic has exposed our vulnerability to emerging infectious diseases and the need to increase our capacity for rapid point-of-care testing. In this project we aim to develop a toolbox of proteins and enzymes identified in the Virus-X consortium for RT loop-mediated isothermal amplification (RT-LAMP) technology to enable the detection of various viral pathogens including SARS-CoV-2. This will enable us to react quickly with new detection systems to emerging infectious diseases.

Research Project

The current 'gold standard' for SARS-CoV-2 detection is the identification of viral RNA in sputum or throat-swaps using RT PCR thermocycler technology. While the protocols are well established, there is an acute lack of sufficient reagents and the required equipment and unmet need for low-cost, reliable tests at the *point-of-care*. Recent developments in RT loop-mediated isothermal amplification (RT-LAMP) technology have enabled detection of various viral pathogens including SARS-CoV-2. Crucially, this single-step assay does not require a thermocycler, and is suited for *point-of-care* detection rivalling the unreliable lateral flow devices that detect antigens. In the Virus-X project a number of enzymes sourced from the virosphere of extreme environments were identified with the potential to enhance a wide range of current molecular biology technologies. The first goal of this project is to unravel the molecular mode of action using a range of biophysical and structural techniques. The second aim is to develop a robust colorimetric detection method and benchmark the assays against conventional and alternative methods currently under development such as mass spectrometric analysis. Importantly, the techniques developed in this project will be transferable to other, newly emerging infectious diseases.

Training & Skills

The successful candidate will benefit from a comprehensive training program including all steps from molecular to structural biology with a focus on X-ray crystallography and the possibility to extend towards small-angle X-ray scattering and cryo Electron Microscopy. This will be complemented by a wide range of biophysical methods including mass spectrometry. Furthermore, the doctoral researcher will be trained in the development and validation of high-throughput assay development. This project will also offer the unique opportunity to work closely with and at our industrial partner, ArcticZymes, located in Tromso, Norway.

Further Information

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How to Apply

To apply for this project please visit the Durham University application portal to be found at: https://www.dur.ac.uk/study/pg/apply/

Please select the course code F1A201 for a PhD in Molecular Sciences for Medicine and indicate the reference MoSMed21_13 in the 'Field of Study' section of the application form. Please note that there is no need to submit a Research Proposal with your application however we do require a Covering Letter, CV, an academic transcript, the contact details of two referees and proof of English language proficiency if appropriate.

Should you have any queries regarding the application process at Durham University please contact the Durham MoSMed CDT Manager, Emma Worden at: emma.worden@durham.ac.uk

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