

PhD studentship (Ref: PhD_VIR-21_NIBSC)

A 3-year full-time PhD studentship is available within the Division of Virology, National Institute for Biological Standards and Control (NIBSC), in collaboration with University College London. The studentship is anticipated to commence in October 2021.

Title

Improving viral outbreak emergency preparedness: development of pseudotypes for viruses with global epidemic potential

Project description

The importance of preparedness against emerging infectious diseases, raised after the Ebola outbreak in 2013-15, has been highlighted by the current COVID-19 pandemic. While it is difficult to predict what pathogens will cause future pandemics, there are several regionally emerging viruses prioritised in the World Health Organisation (WHO) R&D Blueprint, including viruses like Zika virus (ZIKV) which in 2016 was declared a Public Health Emergency of International Concern. The Emerging Viruses group, within the Division of Virology, has been contributing to a rapid response to emergencies caused by enveloped viruses by developing standards and assays for diagnostics and serology. These activities heavily rely on pseudotype virus (PV) technology, covering mainly viruses that bud at the cell surface, e.g. Ebola virus, MERS coronavirus, Lassa virus. However, there are shortcomings in making PVs for viruses that bud intracellularly, e.g. flaviviruses. Many such viruses are currently the cause of tropical diseases with the potential to spread to temperate regions due to climate change.

A PV is a viral particle harbouring the core structure of one virus and the envelope (Env) of a heterologous virus; these PV have been largely employed in gene therapy, serology, virus-host interaction studies and characterisation of reference material. Their use allows a rapid response to new outbreak viruses; for instance, the receptor for SARS-CoV-2 was identified using a PV-based assay just a couple of weeks after the viral genome sequence was published. The use of PV is particularly important in serological assay for BSL3 and 4 viruses, as they can be conducted at a lower containment level (BSL1/2) and do not require enhanced security.

Several backbones have been used for the production of PV, mainly those based on cell-surface-budding viruses, such as human immunodeficiency virus (HIV), murine leukaemia virus (MLV), and vesicular stomatitis virus (VSV) [10]. This has been regarded as an enabling technology and therefore poorly studied. As seen during the COVID-19 pandemic, development of a high titre, reproducible PV for a virus of interest may take weeks to optimise. Laboratories develop their own protocols, anew or adapting existing ones from the literature. Furthermore, correlation with the real virus is crucial and needs to be investigated. A deep understanding of how the different components affect the consistency and yield of the PV production will generate an effective flexible procedure, leading to faster assay development. Furthermore, quality assessment of the PV used in the serology assays will enhance the inter-laboratory consistency in results.

Those viruses which assemble within the intracellular membrane systems are particularly difficult to pseudotype, as the incorporation of their Env on the surface of a PV is compromised by the endoplasmic reticulum (ER) retention signal present on their Env. These include viruses which have caused or have the potential to cause an outbreak such as flaviviruses, e.g. ZIKV, Dengue virus, Japanese Encephalitis virus (JEV), Hepatitis C virus, Rift Valley Fever virus, Crimean Congo Haemorrhagic Fever virus. Alternative system for these viruses is based on non-replicative flaviviruses system. This has been already applied successfully to JEV. We would like to extend the study to other viruses as listed above which are of interest in our group, to prove whether this platform could be an alternative method for internally budding viruses. Furthermore, the project will also compare other PV already in use in the Division (SARS-CoV-2, MERS-CoV, Lassa virus, Nipah virus and Ebola virus) to develop a reliable, effective and flexible methodology which can be applied in different fields in a standardised manner worldwide.

Key responsibilities

- To undertake the research projects in line with the project aims
- To communicate effectively, orally and through written media, undertake presentations at scientific meetings and maintain excellent records

- To interact regularly and effectively with the supervisors and interact appropriately and effectively with other staff
- To fulfil the requirements of the University PhD programme and to undertake specific training as required by the host institutions

In addition to meeting all the academic, security and residency requirements, you will have:

- an academic background in molecular and cellular biology, virology or relevant life sciences
- a demonstrated aptitude in a laboratory setting and motivation to undertake research
- a demonstrated interest in the field of study and ability to work accurately and precisely
- a demonstrated excellent oral and written communication, and IT skills
- a previous experience in one or more of the key interest areas as an advantage

NIBSC, the Centre of the Medicines and Healthcare products Regulatory Agency (MHRA), is a global leader in the characterisation, standardisation and control of biological medicines and has a major role in protecting and improving public health worldwide. NIBSC is the leading WHO International Laboratory for Biological Standardisation and is responsible for producing and distributing over 90% of all WHO International Standards introduced for the quality assurance of biological medicines. NIBSC scientists also test products, carry out valuable research and provide advice on a routine basis and in response to emergencies. The importance of the Institute's work is well recognised nationally and internationally.

The Division of Virology delivers a wide range of internationally competitive activities in standardization, control and underpinning research for virological matters relevant to biologicals for human use. The scope of work includes vaccines (particularly influenza, polio and childhood vaccines), where a great deal of cutting-edge research effort is directed; emerging infections, including those identified as Priority Pathogens by the WHO; enteric viruses and neurovirology

The student will be registered with the Division of Infection and Immunity, University College London. The project is based at the NIBSC, under the supervision of Drs Giada Mattiuzzo and Nicola Rose, in collaboration with Dr Yasu Takeuchi at University College London. The student will participate in the University and NIBSC postgraduate training programmes

Qualification requirements for University College London

Entry requirements are a first class BSc degree or a 2:1 (or international equivalent) but in this case more weight will be given to the standard of the Institution granting the degree. An MSc in a relevant subject (or international equivalent) is also acceptable.

Funding

The studentship covers tuition fees, provision for laboratory consumables and travel to conferences and the University; there is a student stipend of £18,500 p.a.

English language requirements

Applicants whose first language is not English (and whose undergraduate degree was not taught in English) must fulfil the minimum requirements of an IELTS score of 6.5 with no less than 6.0 in any element.

Visas and immigration

Applicants will be subject to UK immigration requirements with demonstration of the right to reside and study in the UK.

To apply

Send (i) your CV including the name and contact details of two academic referees and (ii) a personal statement of no more than 1000 words explaining your interest in this project and aspirations for undertaking a PhD to studentship@nibsc.org by 5 pm (UK time) on Wednesday, 17 February 2021.

Please ensure the studentship reference number PhD_VIR-21_NIBSC is included in the subject line of the email and your personal statement.

If you have a disability defined by the Equality Act 2010 (<https://www.gov.uk/definition-of-disability-under-equality-act-2010>) you may apply under the UK Civil Service Guaranteed Interview Scheme provided that you meet all of the qualifications, skills, requirements and experience defined as essential for the studentship. You must submit the Guaranteed Interview Scheme Declaration form with your application: this can be found at <https://www.gov.uk/government/publications/guaranteed-interview-scheme>. At interview all applicants will be assessed solely on merit.

Any offer of a studentship is conditional upon successful background screening which includes, but is not limited to, checks on identity, qualifications and right to study in the UK.

