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| **\*Title of studentship** | Development of a non-viral delivery system for targeted delivery of nucleic acid therapies across the blood brain barrier |
| **Value / what is covered?** | 100% of UK/ROI tuition fees paid and an annual stipend for UK/ROI residents only (living expenses), currently at ~£15,500 per annum. All consumables costs will also be provided. |
| **Awarding body** | pHion Therapeutics |
| **Number of studentships** | 1 |
| **\*Summary descriptive text / Example of research project** | The blood brain barrier (BBB) is designed to protect the central nervous system from infection and regulate the microenvironment of the brain. However, the brain has a high demand for energy and nutrients. Therefore, multiple mechanisms exist to mediate the uptake of endogenous substances. Such substances may cross the BBB by passive diffusion in a non-energy dependent manner or via energy dependent processes which can include receptor-mediated transport and adsorptive-mediated transcytosis. Additionally, numerous viral infections are known to cross the BBB, one of which is SARS-CoV-2.  These transport systems can be exploited to design new and exciting drug delivery technologies that can carry nucleic acid therapeutics (mRNA, ASO, DNA, miRs). The goal of this PhD is to design and develop a state-of-the-art non-viral delivery system that is based upon natural amino acids to cross the BBB. There is an unmet need to develop targeted delivery systems especially for the repeated application of gene therapeutics.  This project is sponsored by industry with the goal of developing a delivery platform for nanotherapeutics. This projects forms part of an exciting collaborative partnership between Professor McCarthy, a nucleic acids drug delivery expert and CEO of Phion Therapeutics and Prof Nicholas Dunne, a materials engineer and expert in polymeric systems from Dublin City University. The student will benefit from training in both an academic and industry setting including training and placements in pHion Therapeutics. The project workplan encompasses a broad range of molecular biology, physiochemical, material testing, in vitro and in vivo techniques providing the student with an excellent training environment and key transferable skills for future development. |
| **\*Supervisor(s)** | Prof Helen McCarthy (QUB), Prof Nicholas Dunne (DCU) and Dr Monika Ziminska (pHion Therapeutics) |
| **\*Eligibility / residence Status** | UK/ROI Only |
| **Country** | Northern Ireland |
| **\*Start date and duration** | September 2022 for 3 years |
| **\*Faculty** | MHLS |
| **\*Research centre / School** | Pharmacy |
| **Subject area** | Nanomedicine, Gene Therapy, Materials, Non-viral, Delivery, Biotherapeutics |
| **Candidate requirements / Key skills required for the post** | Applicants should have a 1st or 2.1 honours degree (or equivalent) in a relevant subject. Relevant subjects include Pharmacy, Pharmaceutical Sciences, Biochemistry, Biological/Biomedical Sciences, Chemistry, Engineering, or a closely related discipline. Students who have a 2.2 honours degree and a Master’s degree may also be considered, but the School reserves the right to shortlist for interview only those applicants who have demonstrated high academic attainment to date. |
| **\*Deadline for applications** | February 2022 |
| **\*How to apply / contacts** | Postgraduate Research applicants must have applied to Queen’s, via the Direct Applications Portal.  <https://dap.qub.ac.uk/portal/user/u_login.php> |
| **Relevant links / more information** | <http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/>  <http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/> |
| **Keywords for search filters** | mRNA, drug delivery, nanomedicine, Blood brain barrier, non-viral |
| **Training provided through the research project** | The PhD student appointed to this project will have a unique opportunity to work at the interface of the biological and chemical sciences and pharmaceutical engineering, carrying out research in a stimulating environment while receiving both subject-specific and generic skills training. Research techniques will involve physico-chemical analytical techniques (laser spectroscopy, dynamic light scattering, nanoparticle tracking analysis), specialist imaging techniques (Ramen imaging microscopy; hyperspectral imaging; TEM) in addition to a suite of *in vitro* and *in vivo* biological assays to assess therapeutic efficacy.  The School of Pharmacy, QUB, has a highly structured annual review process, consisting of a variety of written and oral assessments. Importantly, this structure has ensured that 100% of PhD candidates have submitted within the allocated time period over the last four years. Additional skills training will be provided by QUB through the Graduate School, supplementing project specific learning. |
| **Expected impact activities** | The fundamental knowledge and core technologies developed in this project are anticipated to ultimately deliver patient benefit. Impact activities include patient focus groups, liaising with clinicians and industry experts, conference attendance and publications. |