



# QUEEN'S UNIVERSITY BELFAST

<b>*Title of studentship</b>	Novel peptide hydrogels as long acting drug delivery platforms
<b>Value / what is covered?</b>	Available as self-funded project
<b>Awarding body</b>	Self-funded
<b>Number of studentships</b>	1
<b>*Summary descriptive text / Example of research project</b>	<p>A significant number of chronic medical conditions: HIV, Alzheimer's disease, tuberculosis, alcohol withdrawal, depression, schizophrenia, malaria prophylaxis and contraceptive cover, suffer from complicated drug treatment regimens that patients find difficulty complying with, negatively impacting therapeutic outcomes. This proposal will study the use of enzyme-responsive peptoid hydrogelators as a new technology platform for development of long-acting injectable (LAI) medicines within these healthcare areas. LAI nanosuspensions composed of water-insoluble drugs are commonly indicated for the treatment of diseases with reduced patient adherence to medication such as schizophrenia. However, alternative formulations are required due to inherent disadvantages with these nanosuspension injectables including difficulties with manufacturing scale-up, the need for water insoluble active drugs ingredients, amorphous drug formation during milling and restrictions relating to drug loading within the formulation. This proposal will investigate the use of our novel peptide and peptoid hydrogels to provide long-acting drug release after administration via subcutaneous injection. Peptoids are biocompatible molecules that mimic naturally occurring peptides. Natural peptides form the building blocks of tissues and skin therefore their application as sustained release injectable implants is promising but limited by their rapid in vivo degradation by enzymes. Peptoids form structured, tissue-like, hydrogel networks in aqueous environments and can offer sustained release of drugs. Here, we aim to investigate the potential of novel peptoid hydrogels for long-acting subcutaneous drug administration. Peptoids are unnatural peptides not recognised by host enzymes and can therefore provide long-term stability as a hydrogel platform. An added advantage is that our low molecular weight peptide-like motifs are less than seven amino acids in length. They are attractive to pharmaceutical use as they are more cost-effective to synthesise and amenable to scale-up manufacture compared to larger peptides and proteins utilized throughout medicine, improving potential clinical translation to patients. The formulations will comprise a peptide or peptoid backbone capable of hydrogelation; a phosphate group to increase aqueous solubility and whose enzymatic removal triggers hydrogel formation in vivo; and eight model drugs each attached via a physiologically hydrolysable group and characterised separately for in vitro and in vivo drug release. Drugs are selected based on their association with complicated drug treatment regimens and would therefore provide maximal therapeutic benefit in a long-acting formulation (e.g.</p>

	once monthly administered).
<b>*Supervisor(s )</b>	Dr Garry Laverty
<b>*Eligibility / residence Status</b>	UK/EU and International subject to Visa acceptance
<b>Country</b>	Northern Ireland
<b>*Start date and duration</b>	1 October 2018
<b>*Faculty</b>	MHLS
<b>*Research centre / School</b>	Pharmacy
<b>Subject area</b>	Biofunctional nanomaterials, drug delivery
<b>Candidate requirements / Key skills required for the post</b>	Applicants should have a 1st or 2.1 honours degree (or equivalent) in a relevant subject. Relevant subjects include Pharmacy, Molecular Biology, 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
<b>*Deadline for applications</b>	Open
<b>*How to apply / contacts</b>	Postgraduate Research applicants for Pharmacy who are interested in applying for a studentship must have applied to Queen's, via the Direct Applications Portal, and submitted all required supporting documents by the closing date, which will be announced later in the Academic year.  <a href="https://dap.qub.ac.uk/portal/user/u_login.php">https://dap.qub.ac.uk/portal/user/u_login.php</a>
<b>Relevant links / more information</b>	<a href="http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/">http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/</a>  <a href="http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/">http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/</a>
<b>Keywords for search filters</b>	Experimental medicine, Pharmaceutical Sciences, Drug delivery, HIV, Alzheimer's disease, tuberculosis, alcohol withdrawal, depression, schizophrenia, malaria and contraception
<b>Training provided through the research</b>	This research will be conducted at the School of Pharmacy Queen's University Belfast which in 2017 was ranked for the third consecutive year as the top UK School of Pharmacy (Sunday Times Good University Guide) underpinning the school's investment in and commitment to world-class facilities and staff, with

<p><b>project</b></p>	<p>internationally leading research programmes. The School of Pharmacy Queen's University Belfast was particularly outstanding ranking as first amongst Pharmacy submissions in REF 2014. The School of Pharmacy is a leading UK centre for pharmaceutical research and has been supported by philanthropic donations of more than £7 million for strategic research developments. The School's research strategy has focused on developing high profile projects, including in cancer and dermatological therapies that ultimately have the potential to meet identified clinical needs and, consequently, also have high priority status with the pharmaceutical industry. As a member of the Russell Group, Queen's University Belfast which is consistently recognised as one of the leading universities for knowledge exchange in the UK, thus ensuring research is creating jobs, wealth, skills and innovation. The projects lead investigator Dr Laverty is a PhD graduate from the School of Pharmacy and has first-hand knowledge experience of the successful pathway a PhD from Queens University Belfast can provide. The Postgraduate Research Committee (PGRC) advises and supports all PGR students, ensures appropriate training is provided, considers all matters relating to recruitment, admission, progress and examination for postgraduate degrees, monitors and reviews supervision, appoints external examiners, reviews complaints, refers student appeals to the University Postgraduate Appeals Committee and also submits an annual report to the University Postgraduate Office. The School of Pharmacy expects monthly meetings with students where electronic records must be kept. Students must also complete a three-month initial review and annual progress review to proceed to years two and three. The annual progress review involves written work, presentation and/or mini viva. These are the standard management and monitoring arrangements that must be adhered to by the academic partners. As such the School of Pharmacy has the best PhD completion rates within Queen's University Belfast. Each PhD student must also complete the centrally organised Queen's University Belfast researcher development framework program consisting of 30 days of training. These have been created by vitae, and endorsed by the QAA and Research Councils UK. The training areas include four domains that encompass: (A) knowledge and intellectual abilities, (B) personal effectiveness, (C) research governance and organisation and (D) engagement influence and impact. For this studentship the student will be trained in the following generic skills; developing writing skills, developing presentation skills, power point for academic presentations and posters, communication skills, introduction to research design, academic plagiarism, basic and advanced statistics, networking and negotiating, lab demonstrating and introduction to ref works. Students are also encouraged to use the Personal Development Planning (PDP) process to build a portfolio on learning, performance and achievement. PDP encourages the students to adopt a good work practice and supports the timely submission of thesis. The student will receive formal training in the following specialist skills necessary for this project; peptide/peptoid synthesis, confocal microscopy, scanning and transmission electron microscopy, tissue culture, HPLC, Fourier Transform infra-red spectrometry, circular dichroism, Mass Spectroscopy, NMR, HPFC and in vivo facilities. The combination of these skills is highly transferable and should give the student a distinct advantage in the employment sector.</p>
<p><b>Expected impact activities</b></p>	<ul style="list-style-type: none"> <li>-Involved in development of intellectual property</li> <li>-Attendance at relevant conferences</li> <li>-Engagement with industry, patients and key stakeholders</li> <li>-Generation of publications</li> </ul>

