Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Panoz Pharmaceutical Innovation PhD Scholarships 2022

Mechanosynthesis as a green technology to advance oral solid dosage forms

PI: Professor Lidia Tajber

Co-PI's: Professor Anne Marie Healy, Professor Deirdre D'Arcy

Post Summary

The Pharmaceutics and Pharmaceutical Technology laboratory of Associate Professor Lidia Tajber at Trinity College Dublin is searching for an excellent PhD student to join the team to work on a Panoz Pharmaceutical Innovation PhD Studentship project. This is a collaborative project supported by internal collaboration provided by Prof. Anne Marie Healy and Assoc. Prof. Deirdre D'Arcy on green technologies to advance oral solid dosage forms.

The overarching aim of this project to concentrate on solving a critical problem, which is the delivery of poorly soluble active pharmaceutical ingredients (APIs) into the body, and to do so using a solvent-free, green and sustainable pharmaceutical approach. The specific approach to be employed is mechanochemistry, a disruptive process in which mechanical motions/energy control chemical and physical transformations. We have shown that this specific process can be used to synthesise pharmaceutical ionic liquids, as a means of improving solubility of APIs, in a sustainable manner and this project investigates the next step, which is to convert ionic liquids into formulations by hot melt extrusion, another solvent-free process. This research will involve: mechanochemical synthesis of pharmaceutical ionic liquids, rational selection of suitable polymers utilising predictive and semi-predictive models, determination of the parameters of the extrusion process and assessment of the formulation-related parameters. The PhD student will undergo structured training and development, including completion of a Postgraduate Certificate in Innovation offered by Tangent, Trinity College Dublin.

Standard Duties and Responsibilities of the Post

The PhD student will carry out high quality research as part of the requirements for a PhD degree at Trinity College Dublin. They will also engage in the structured component of the degree, as required by the university. The student will be involved in training, education and public engagement as well as occasional teaching demonstrations. In addition, the student will be required to attend regular meetings with the supervisors and the research group, attend other meetings if required, write reports, communicate and disseminate information/research findings at conferences, collaborate with other lab members and publish research findings. They are expected to be eager to learn and enthusiastic about their area of study.

Person Specification

This PhD studentship would be ideally suited to someone who is highly motivated, has an aptitude/strong interest in pharmaceutics research and is considering a future in academic or

industry research. Excellent interpersonal skills are required to communicate efficiently with other members of the School, the research group, and the other PhD students funded through the Panoz Pharmaceutical Innovation programme.

Qualifications

At least a 2.1 honors degree in pharmacy, chemistry, pharmaceutical/material sciences, or a related discipline.

Knowledge & Experience (Essential & Desirable)

- Proficiency in the English language (essential)
- Familiarity with pharmaceutical sciences and/pharmaceutical technology subjects (essential)
- Experience in presenting research results in written and oral formats (desirable)
- Previous research experience (desirable)

Skills & Competencies

- Basic data analysis and mathematics skills (essential)
- Outstanding communication, interpersonal and organisational skills (essential)
- Ability to set clear research goals (essential)
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Extracellular Vesicles in Allergic Contact Dermatitis (EV-ACD)

PI: Professor Lorraine O'Driscoll

Co-PI's: Professor Niamh O'Boyle

Post Summary

The candidate will be a PhD student working on the project Extracellular Vesicles in Allergic Contact Dermatitis (EV-ACD) in the dynamic environment of Trinity Biomedical Sciences Institute (TBSI) and will have the opportunity to participate in training courses, workshops, and conferences. Prof. Lorraine O'Driscoll and Dr. Niamh O'Boyle (School of Pharmacy and Pharmaceutical Sciences) will co-supervise the research project. This is a four-year PhD programme.

EV-ACD project details: Over a quarter of the European population suffer from skin allergies due to exposure to chemicals known as contact allergens in their environment. Allergic contact dermatitis (ACD) is an immune response to repeated chemical exposure. Diagnosis of ACD is difficult, treatment is symptomatic, and no biomarkers are characterised due to lack of understanding of the underlying causality. The chemical structure and properties of the offending allergen affect skin penetration, reaction with biomolecules and immunogenicity. Contact allergens are observed to induce formation of micrometer-sized extracellular vesicles (EVs)(5 – 10 µm in diameter) in normal human epidermal keratinocytes in cell culture. This project will investigate the type(s) of EVs released from keratinocytes *in vitro* by characterising their size and contents in response to contact allergens of different strengths. It will also examine the effect of keratinocyte-derived EVs on dendritic cell activation. This will improve our knowledge of the underlying mechanism of skin allergy, potentially paving the way for pharmaceutical innovations in the diagnosis and treatment of ACD.

Standard Duties and Responsibilities of the Post

The successful candidate will be responsible for development of the project, in consultation with the supervisors. They will undertake literature reviews, devise experimental procedures and perform experimental work. Experimental work will include chemical reactions, analytical chemistry and flow cytometry. Training will be provided in new techniques. The candidate will present their work at national and international seminars and conferences. The candidate will take one of the award-winning full PG Certificate programmes offered by Tangent over the four years of the PhD: PG Cert in Creative Thinking, Innovation and Entrepreneurship or the PG Cert in Innovation and Enterprise Development.

Person Specification

Qualifications

Essential Qualifications: A degree (minimum 2.1) in biochemistry, pharmacology, medicinal chemistry, pharmacy, or a related discipline.

Knowledge & Experience (Essential & Desirable)

Desirable: A good understanding of biology and experience in cell culture techniques.

Skills & Competencies

The ideal candidate should be a motivated and independent individual, with good communication, organisational, and planning skills, and the ability to work as part of a team.

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Development of ergothioneine-containing liposomes for aerosol therapy of chronic obstructive pulmonary disease

PI: Professor Carsten Ehrhardt

Co-PI's: Professor Suzanne Cloonan (School of Medicine) , Professor John Walsh

Post Summary

The School of Pharmacy and Pharmaceutical Sciences at Trinity College, the University of Dublin, is seeking a candidate for a 'Panoz PhD Scholarship in Pharmaceutical Sciences' working on the project ***Development of ergothioneine-containing liposomes for aerosol therapy of chronic obstructive pulmonary disease.*** The PhD scholar will be supervised by Professor Carsten Ehrhardt and co-supervised by Associate Professors Suzanne Cloonan and John J. Walsh. The project will have 3 Specific Aims:

1. To formulate and fully characterise ergothioneine (ESH)-encapsulating liposomes suitable for aerosol delivery
2. To investigate if these liposomes facilitate intracellular delivery of ESH to human lung epithelial cells *in vitro* and to determine if cell cultures treated with liposomal ESH are protected from oxidative damage
3. To study if aerosol delivery of ESH liposomes protects from damage caused by oxidant exposure in an *Octn1*-deficient mouse model

Standard Duties and Responsibilities of the Post

The successful candidate will be based in Dublin and will be undertaking rigorous primary research, publishing findings in top-quality scholarly journals and presenting papers based on the research at meetings and conferences. The successful candidate will also be expected to actively contribute to the following activities:

- Formulation development of ESH containing liposomes
- Uptake studies in human lung epithelial cell cultures
- ROS assay and cytotoxicity in human lung epithelial cell cultures
- Liposome delivery studies to animal models of chronic obstructive pulmonary disease (COPD)
- Collaborating with the PI and project partners
- Undertaking all necessary reporting
- Attending project meetings
- Writing and contributing to academic papers and research briefs arising from the research findings
- Representing the best interests of the Programme at all times
- Performing such other duties as may be required

- Take one of the award-winning full PG Certificate programmes offered by Tangent over the four years of the PhD: PG Cert in Creative Thinking, Innovation and Entrepreneurship or the PG Cert in Innovation and Enterprise Development

Qualifications

The successful candidate must hold a degree in pharmacy or a cognate discipline, e.g. Molecular Medicine, Physiology or Pharmacology.

Knowledge & Experience (Essential & Desirable)

The successful candidate will have:

- Excellent knowledge of pharmaceutical sciences with a particular emphasis on pulmonary drug delivery
- An understanding of the operational requirements for a successful research project.
- Evidence of publication commensurate with career stage.
- Initiative, ability to work independently and as part of a team.
- Willingness to undertake training and career development
- Flexibility to work irregular hours on occasion

It is desirable that the successful candidate will have:

- Experience in HPLC analytics
- Experience in the formulation of liposomes
- Experience in animal handling, ventilation and measurement of respiratory mechanics in large animals
- Standard laboratory skills including cell culture, ELISA, protein quantification and Western Blotting
- Cell biology experience, ideally with epithelial cells
- Ability in using confocal microscopy

Skills & Competencies

- Strong organisational and administrative skills with the ability to prioritise objectives
- Good communication skills

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The SAFEGUARDING-Psychotropic Use Project: Supporting sAFE and GradUAL reDuction of loNG-term Psychotropic Use

PI: Professor Cathal Cadogan

Co-PI's: Professor Anne Marie Healy, Professor Andrew Harkin

Post Summary

There is a growing cohort of patients looking to discontinue long-term use of psychotropic medication (e.g. antidepressants, benzodiazepines) for various reasons including medication-related adverse effects. A key challenge in tapering psychotropics involves achieving required dose reductions using existing marketed products which typically come in tablet or liquid form. These products are licensed for treating the original condition (e.g. depression) with therapeutic doses and not specifically formulated to facilitate tapering, which can require subtherapeutic doses. Increasingly, patients are resorting to the internet for guidance and, using DIY ('do-it-yourself') tapering approaches by making modifications to products (e.g. splitting tablets, diluting liquids) at home. However, it is not known whether these approaches allow safe and accurate dosing to facilitate psychotropic tapering. This PhD project aims to evaluate the ramifications of different 'DIY' manipulations to pharmaceutical dosage forms used in psychotropic tapering plans. This will involve assessing different manipulations to psychotropic dosage forms in terms of: (1) dosing variability; (2) formulation particle size distribution and stability; (3) the withdrawal response using animal models. Project findings will provide vital information to inform the deprescribing of long-term psychotropic use through safe and gradual dosage reduction, as well as future research into novel formulations for optimising tapering.

Standard Duties and Responsibilities of the Post

This PhD project will look to evaluate the impact of different manipulations to pharmaceutical dosage formulations used in psychotropic tapering plans on psychotropic withdrawal. The successful candidate will:

1. Assess the variability in dosing between different manipulations to pharmaceutical dosage formulations using quantitative analytical methods, including HPLC-based assays;
2. Assess the particle size distribution and stability of formulations used by patients in psychotropic tapering plans;
3. Develop and test an animal model of the withdrawal response to psychotropic tapering using implantable radiotelemetry.

Patient and Public Involvement (PPI) will be embedded throughout the project. Additional training/support will be provided to ensure that PPI activities are conducted to the highest standard.

Person Specification

Below is a list of several qualities and qualifications of an ideal candidate for the position. Please note that it is unlikely that any one PhD candidate will have them all. Therefore, strength in one area can make up for less experience in another. However, prospective candidates must meet the essential criteria at a minimum. Carefully consider your motivation for embarking on a PhD, the skills/experience that you think make you well suited to this project and a future career in science. These points should form the basis of a cover letter expressing your interest in the role.

Qualifications

- First Class or 2.1 Honours (or equivalent) Bachelor's Degree or equivalent in pharmacy, pharmaceutical technology, pharmaceutical science, pharmacology, chemistry, medicinal chemistry or related subject (Essential)
- A Master's degree in a relevant field (Desirable)

Knowledge & Experience (Essential & Desirable)

- Familiarity with quantitative pharmaceutical analytical methods, including HPLC-based assays [Essential]
- Familiarity with implantable radiotelemetry [Desirable]
- Knowledge of psychotropic medication and associated withdrawal syndrome [Desirable]
- Understanding of the role of Patient and Public Involvement (PPI) in research [Desirable]

Skills & Competencies

- Stimulated by challenging scientific and technical problems and have a highly motivated, persistent and result-driven attitude
- Ability to work well both independently and in a team environment, with a sense of responsibility
- Strong written and oral communication skills
- Strong organisational, planning and time management skills
- Strong record keeping and data handling skills
- Critical thinking / analytical skills
- Attention to detail
- English language certification if English is not first language; please refer to: https://www.tcd.ie/study/apply/admission-requirements/postgraduate/index.php

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