

Faculty of Science and Health



Faculty Research Committee

Undergraduate Summer Research Internship Scheme 2019

Project Title: Sports-Related Concussion: Investigating Clinical Tests, Blood Biomarkers and In Vitro Markers to Enhance Diagnosis in Ladies Gaelic Football

Principal Investigator: Dr Keith Rochfort

School/Research Centre: School of Biotechnology

PROJECT DESCRIPTOR

The Endothelium Biology Group has been engaged in developing *in vitro* translational models of the vasculature to study the physiological and pathophysiological mechanisms of the *in vivo* environment. Consequently, we have consciously strove to marry our laboratory findings with the relevant animal and clinical studies in order to advance the understanding of specific vascular disease states.

Our latest IRC-funded PhD project within our cerebrovascular research stream presents an exciting new venture wherein our lab will collaborate with the Sports Medicine Cluster of the School of Health and Human Performance. Our laboratory has extensive molecular-level experience in modelling the physiological and pathophysiological mechanisms that influence the cerebral microvasculature, the inflammation of which is a key underlying feature of neurological disorders and concussion, highly topical forms of neurological injury. This project will assess the validity of a number of novel biomarkers of “simulated concussion injury” by measuring their respective levels in athletes diagnosed with concussion using the predictive value of multiple clinical tests coupled with measurement of potential systemic neurological markers of cerebrovascular injury. Ultimately, this will enable the development of a clinical test for concussion with pitch-side/clinical application, suitable for the community sport setting.

Ms. Róisín Leahy is the IRC PhD candidate undertaking this project and will be the primary point of contact within our research team for the successful candidate. Working closely with Ms. Leahy, the candidate will have the opportunity to assist in the clinical branch of this project, managing/coordinating recruits and associated biomarker assay readouts during the initial assessment phase of the study. They will be expected to attend research team

meetings, to learn how to manage large data sets/databases, to be able to present their work/findings, and update/coordinate with the team on the project as it develops.

Principal Investigator BIO

I am the Senior Post-Doctoral Scientist of the Endothelium Biology Group (EBG) located in the School of Biotechnology, with research facilities in both the Lonsdale Building and the National Institute for Cellular Biotechnology. The pathological mechanisms of the vascular system are the core focus of my research career to date. Stemming from my PhD into the physiological and pathophysiological mechanisms that influence the cerebral microvasculature, I have evolved my career around the concept of molecular mechanisms that drive health and disease throughout the entire vascular system. As part of the EBG, I have published extensively within the team on cerebrovascular biology (8 papers), with a specific focus on inflammatory mediators associated with chronic, patho-progressive conditions such as neurological diseases and concussion.

I was recently successful in securing IRC-funding as co-PI with Dr. Siobhán O' Connor for incoming PhD student, Ms. Róisín Leahy. The enterprise-partnership award that unites the EBG (DCU), and the Sports Medicine Cluster (DCU), with the Ladies' Gaelic Football Association (LGFA), will bring together the expertise and resources of the three stakeholders to enable a multi-disciplined approach in examining the highly topical issue of sports-related concussion with the aim of generating translatable research towards enhancing diagnosis in community sports.

Our teams have extensive experience in supervision of research projects from undergraduate to post-doctoral level. In an ongoing effort to develop my academic PI skills, I have personally mentored numerous 4th year undergraduate/masters research projects, and assisted countless PhD projects. This application represents my first attempt at the UGSRI Scheme; successful award of which I consider an important career-development step personally towards my aim of becoming an independent investigator. In ensuring my first project is a success both Dr. O' Connor and Dr. Enda Whyte of the Sports Medicine Cluster have experience with this scheme, and, along with Assoc. Prof. Phil Cummins, will have agreed to support this internship by way of supervisory oversight and provision of resources.

JOB DESCRIPTOR

Concussion is a form of mild traumatic brain injury that results in functional neurological disturbances without structural brain damage. In sport, poor management of concussion is associated with a higher risk of complications and prolonged recovery times, emphasising the need for timely and appropriate management. With community-based sports, concussion is often poorly managed due to underreporting, limited diagnostic tools, and a lack of knowledge on the part of the those (typically players and coaches) who are responsible for recognising and managing instances of concussion.

A recently funded collaborative research project that brings together the School of Biotechnology, the School of Health and Human Performance, and the Ladies' Gaelic Football Association, is aiming to create a safer playing environment in community sport by **developing a much needed multi-level concussion identification and management strategy**. Overall, the candidate will be contributing to a nationally funded project, which aims to make important contributions to improving (i) the behaviours of athletes following concussion, (ii) concussion diagnostics, and (iii) concussion-related interventions.

The candidate who is successful in securing the internship will assist our research team primarily in the following activities scheduled this summer:

- Recruiting participants during pre-season
- Assessing concussion history, underreporting, and reasons for disclosure/non-disclosure in participants using a validated questionnaire
- Coordinating participants undergoing the current method for concussion reporting (SCAT5 questionnaire) against a novel battery of clinical practical tests for concussion

The candidate will receive full training for all activities undertaken within the project, and will also have the opportunity to experience other facets of the project including wet laboratory work. The candidate will also be expected to participate in the general day-to-day activities within the research group such as disseminating findings during research group meetings, compiling/recording data in report/lab book form, generating and managing project-associated databases, and carrying out administrative work where necessary.