

Modelling growth and morphogenesis of colonic organoids

University of Adelaide-University of Nottingham Joint PhD in Mathematics

Supervisors

This project is offered jointly by the University of Adelaide and the University of Nottingham and will be supervised by: Prof John King (University of Nottingham) and Dr Edward Green (University of Adelaide). Collaboration with Dr Daniel Worthley, Gastrointestinal Cancer Group, South Australian Health and Medical Research Institute (SAHMRI) www.sahmri.com/our-research/themes/cancer/groups/gastrointestinal-cancer-biology-group

Project Information

Organoids are three-dimensional in vitro tissue cultures which mimic (to some degree) the distinctive in vivo structure of the organ from which they derive. In this project, we will focus on organoids grown from intestinal tissue, which are used for research into colorectal cancer, one of the most common cancer types. Although colonic organoids are being grown successfully by various research groups, at present their growth and development are not well understood. They can vary in morphology e.g. 'budded' and 'cystic' types are observed, but the reason for this, and its possible significance for the usefulness of the organoids in research is unknown. Furthermore, for potential applications in personalised medicine, there is a need to optimise the culture process to grow larger quantities of tissue more rapidly.

This project will develop new mathematical models for organoid growth and development, based on the principles of morphoelasticity. We will investigate the role of growth induced buckling in determining their form (cystic or budded), taking into account the potential roles of different cell populations, and chemical signals in this process. Our models will be validated against experiments being undertaken by Dr Daniel Worthley's group at the South Australian Health and Medical Research Institute (SAHMRI).

Joint PhD Arrangements

Applications are invited to this Joint PhD project in Mathematics between The Universities of Adelaide and Nottingham. The scholarship provides fully funded 3-year PhD studentships. Students will be co-supervised by staff at both universities and will undertake a minimum period of research of 18 months at each institution. The Adelaide-Nottingham Doctoral Scholars will be primarily based on the North Terrace Campus in Adelaide and on the University Park campus in Nottingham. Both campuses are renowned for their world-leading research and their outstanding facilities for research and teaching.

PhD graduates will obtain a jointly awarded degree from the University of Adelaide and the University of Nottingham. The studentships will cover PhD tuition fees, plus a stipend corresponding to the standard research council rate in the UK or the APA rate in Australia. Subject to satisfactory progress, the duration of the stipend will be 3 years including time spent at the partner overseas campus.

Eligibility

Applicants should hold or be about to complete a degree in Mathematics or a closely related subject area. Those with UK qualifications should have, or expect to obtain, a first-class Honours degree and/or a distinction or high merit at MSc level. Under exceptional circumstances a good 2:1 or Merit degree can be considered. Applicants with Australian qualifications should have an Honours degree (Class 1 or 2A) or a Masters degree with a significant research component. Equivalent international qualifications can be considered.

Applicants should have UK or EU status for PhD fees or, alternatively, should be Australian Permanent Residents/ Citizens. Full international applicants can be considered provided they have an alternative means to cover the difference in tuition fees.

The project is available to begin either immediately or in the 2017/2018 academic year.

This studentship is open until filled. Early application is strongly encouraged.

Applications

UK or EU applicants should apply online at:
<http://www.nottingham.ac.uk/pgstudy/how-to-apply/apply-online.aspx>

Please include in your application, a covering letter to indicate your interests and why you are applying to the "Joint Nottingham-Adelaide PhD", and indicate the specific project(s) that you wish to apply for.

Informal enquiries may be addressed to the individual project supervisors or PM-pg-admissions@exmail.nottingham.ac.uk

Australian Permanent Residents/ Citizens should apply online at:
<http://www.adelaide.edu.au/graduatecentre/admission/>

using the domestic or international application as appropriate; please upload a covering letter indicating the specific project that you wish to apply for, your interests and why you are applying together with your CV. Informal enquiries may be addressed to the individual project supervisors or the Postgraduate Coordinator, School of Mathematical Sciences: pgc.maths@adelaide.edu.au.