3 Year PhD Studentship available for September 2019

**Department:** Cardiovascular Sciences and Health Sciences

**Supervisors:** Dr Athanasios Didangelos  
Professor Louise Wain

**Eligibility:** UK/EU applicants only

**Project Title:** Developing a new bioinformatics platform for integration and analysis of high-throughput 'omics data to inform drug discovery and precision medicine approaches

**Project Description:**

This PhD project aims to develop innovative bioinformatics platforms for deep mining of multi-omics datasets, to extract clinically meaningful information in order to identify new ‘druggable’ biological targets associated with tissue inflammation and fibrosis that are crucial for the development of targeted therapeutics for common diseases (lung, cardiovascular and renal).

During this PhD project, the student will develop advanced computer language (R and Python) and bioinformatics skills to design and build the new platform. The student will also learn the molecular biology and biochemistry techniques required for the preparation of clinical samples for high-throughput ‘omics experiments in order to test and validate the utility of the bioinformatics platform. The student will benefit from our expertise in quantitative proteomics, target mining and validation (Didangelos) and experience in the use of genomics for drug discovery and development in respiratory diseases (Wain).

**Background**

Advancing the mechanistic understanding of disease is a key driver for the development of new precision medicine interventions. Current high-throughput genome-wide association, transcriptomics and proteomics approaches are effective tools in the identification of new genes, proteins and pathways with important bioactivity in human disease. A major challenge is to identify and prioritise which of the many, often thousands, of differentially regulated candidates should be prioritised for further research and drug targeting. Moreover, while there is a wealth of modern high-throughput ‘omics (“big data”) resources and bioinformatics tools that could be used to address this issue, their utility is limited by their complexity and inaccessibility, with optimal exploitation of these resources only achievable by those with specific expertise. Consequently, there is a need for advanced but also accessible bioinformatics platforms, to analyse and extract clinically meaningful information from omics data. This will enable efficient use of valuable ‘omics resources by the broader research community and will promote in-depth understanding of disease mechanisms and precise drug targeting of key clinically-relevant genes and proteins.
Proposed Study

The proposed PhD project aims to build a new bioinformatics platform for deep mining of high-throughput ‘omics datasets to isolate common disease signatures and candidate genes with involvement in inflammation and fibrosis across different tissue pathologies. With a primary focus on lung inflammation and fibrosis. The student will be based in the Didangelos Lab and will benefit from significant interactions with the Genetic Epidemiology group (Wain) and interactions with translational clinical scientists working on lung (Gooptu, Bradding) and renal (Barratt) disease.

The student will have the opportunity to combine computational and wet-lab skills as necessary for project development. Broader transferable skills will be developed via courses delivered through the Doctoral College. The student will be encouraged to apply and attend external computational and bioinformatics courses through EBI and Wellcome Trust programs. This project also has the potential for industry placements.

Experimental Methods and Research Plan

The project will initially focus on the development of a new bioinformatics pipeline incorporating 4 core analysis modules which will combine extensive text-mining algorithms and mathematical information derived from gene interaction networks to identify differentially regulated molecules from input datasets that are ‘scored’ and evaluated as likely drug targets and/or disease biomarkers. Other bioinformatics approaches will include the integration of publically or in-house available ‘omics datasets, to identify consistently regulated genes/proteins, transcription factor analysis and epigenetic regulation.

The outputs of the bioinformatics pipeline will then be experimental evaluated at the mRNA and protein level using clinical samples.

The work will to lead to the development of a new bioinformatics toolbox that enables deep and intelligent mining of high-throughput ‘omics data focusing on disease mechanism and drug discovery research. Resulting in future potential for precision medicine interventions in Leicester and in the wider research community.

Funding details:

This project is in competition for a College of Life Sciences (CLS) PhD Studentship. The Studentships are for three years, starting September 2019, and offer tuition fees at UK/EU rates and a Stipend at UK Research Council rates.

Entry requirements:

Applicants are required to hold/or expect to obtain a UK Bachelor Degree 2:1 or better in a relevant subject. Candidates with BSc or MSc in Bioinformatics or Computational Biology or a Biosciences degree and solid experience in Bioinformatics or Computational Biology are particularly encouraged to apply.

The University of Leicester English language requirements apply where applicable.

How to apply:

You should submit your application using our online application system.
Apply for a PhD in Cardiovascular Sciences

In the funding section of the application please indicate you wish to be considered for a LPMI/BRC/RS studentship

In the proposal section please provide the name of the supervisor and project title.

Project / Funding Enquiries:

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Application enquiries to pgradmissions@le.ac.uk