CRUK/EPSRC PhD Studentship in Network Cancer Medicine
Department of Mathematics & Department of Surgery and Cancer

Title: "Tracking the metabolic footprints of cancer using network analysis"

We have an exciting opportunity for a student who wishes to work at the interface of cancer biology, network theory and data science. The project is part of a thriving collaboration between the Biomathematics Group (D Oyarzún, M Barahona) and the Cancer Metabolism & Systems Toxicology Group (H Keun) at Imperial College London. The student will be based at EPSRC Centre for Mathematics of Precision Healthcare in South Kensington, at the heart of London's cultural and scientific quarter.

Description - Abnormal metabolism is a hallmark of cancer cells. Yet the complex connectivity of metabolic networks makes it difficult to establish how misregulation of specific pathways translates into malignant phenotypes. In this project we will study metabolism of tumour cells with a mix of network theory and high-dimensional data analysis. We will build graph models from genome-scale metabolic reconstructions and interrogate them with the various tools from network science, such as centrality analyses, graph embeddings and community detection.

The goal is to capture systemic changes in metabolic network for various environmental conditions and genetic alterations, so as to find new drug targets and biomarkers for tumour malignancy. Models will be refined with available omics datasets, together with cutting-edge metabolomics/fluxomics data from the Keun lab at the Department of Surgery & Cancer. We will test the novel therapeutic interventions with various interference experiments (siRNA, shRNA/CRISPR, small molecule inhibitors) in specific tumour cell models.

Candidate - The ideal candidate should have an excellent academic record and passion for computational methods for medicine. We seek someone open-minded, creative and willing to explore new ideas as part of a multidisciplinary team. The candidate should have excellent mathematical and computational skills, as well as outstanding presentation skills for various audiences. Applicants must hold a First Class or an Upper Second Class degree (or equivalent overseas qualification) in a discipline relevant to the project, such as Mathematics, Bioengineering, Biochemistry, Computer Science, Physics or Control Engineering. It is expected that candidates hold (or be near completion of) a Masters-level degree in an area relevant to the project. Experience with cancer biology and/or flux balance analysis would be advantageous.

The award is for 48 months full-time and covers course fees at the Home/EU rates and a flat rate, tax-free stipend of £21,000 per annum. The position co-funded by the Imperial College Cancer Research UK Centre and the EPSRC Centre for Mathematics of Precision Healthcare. The student will benefit from the thriving environment of the CMPH composed of mathematicians, clinicians and public health specialists working on data-based solutions for healthcare. This will also afford the student close contact with end users and industrial partners developing personalised cancer diagnostics and therapeutics.

To apply please contact Dr Diego Oyarzún (d.oyarzun@imperial.ac.uk), Dr Hector Keun (h.keun@imperial.ac.uk) or Prof Mauricio Barahona (m.barahona@imperial.ac.uk). Applications should include a CV and names of two referees.