Auckland Bioengineering Institute funded postgraduate projects for 2010

These projects provide for tuition fees plus a stipend of $25,000 per annum.

PhD projects

The multi-tasking endothelium: spatial and temporal dynamics of endothelial cells

The endothelium is the monolayer of cells strategically located at the interface between circulating blood and the surrounding tissue. It is a highly complex and dynamic interface, and involved in a primary role, or in an accompanying role, in most disease states across many organ systems. Using imaging, in vivo experimental models, and mathematical models, we seek to better understand the mechanisms of endothelial cell heterogeneity and its relation to health and disease, in particular atherosclerosis.

Modelling and mapping the human gastrointestinal system in health and disease

This is an exciting opportunity for motivated bioengineering graduates to join an innovative and productive research group at the Auckland Bioengineering Institute. You will be part of a multi-disciplinary team of surgeons, gastroenterologists, physiologists and bioengineers, in our clinically-focussed research program examining the function of the gastrointestinal tract. Your research will be involved with the multi-scale modelling of the electrical activity in the normal and diseased GI tract.

The dynamic lung: how mechanical environment affects lung function

The mechanical environment around lung cells depends on the physical properties of the surrounding tissue (stiffness, density, water content) and the forces exerted during breathing (stretch, pressure). We propose to understand how the mechanical environment affects the structure and function of individual cells as well as interaction between different cells and cell types using cell culture systems, imaging and mathematical modelling.

Predicting pulmonary hypertension and hypoxemia in pulmonary embolism

This project will develop and test hypotheses concerning the mechanisms that determine lung blood re-distribution, blood pressure, and gas exchange when flow to a portion of the lung is reduced. Experimental and clinical measurements will be used to inform and validate sophisticated structure-based computational models of the lung, that will in turn be used to study interacting mechanisms in the compromised lung.

4 December 2009

Predicting airway hyper-responsiveness, from molecule to organ

This project will study force development in the lung during airway constriction, and how it is affected by the dynamics of breathing, regional differences in tissue forces, and deep inspirations. A multi-scale computational model that spans from cellular calcium and cross-bridge dynamics to the mechanics of the whole lung will be the fundamental tool used in the project.

Assessing inter-subject variability in lung airway particle deposition and pollution uptake

Inhaled aerosolized therapies or pollutants transport to and deposit in different regions of the airway tree depending on particle size, airway topology, and ventilation distribution. The degree to which inter-subject variability in airway geometry and its interplay with regional lung mechanics is important in airway particle transport has not previously been studied. This project will use sophisticated multi-scale models to study aerosol transport in a virtual population of subjects.

Cybernose - hand-held biosensors that smell like insects

Join a multidisciplinary team working to develop a small, portable biosensor based on the fly's sense of smell. We are looking for potential graduate students with an interest in machine learning, neural networks and biological signalling, to work towards development of a novel biotechnology application.

Mapping and modelling the atria

In this project you will be involved with detailed multi-scale modelling of the atria. The project will also involve the experimental validation of the models, for which new novel electrode platforms will be developed and employed during experiments involving high-resolution mapping of atrial electrical activity.

Contact the ABI for more information

For more information on these projects or funding opportunities, please contact:

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