Postgraduate Research Scholarship: Blood Vessel Engineering

The Project

**Mission:** To create *in vitro* model systems that mimic aspects of blood vessel function to understand healthy and pathological states in order to prevent disease and improve treatments.

**Overview:** Replicating aspects of physiological function of the vasculature *in vitro*, including multiple cell types and flow, has been lacking in the field. There is significant potential for generating lab-based models of human blood vessels to study underlying biology, pathology and prevention and treatment options. This work is part of a larger project to build a portfolio of models at multiple length scales, from the micron to the macro, bioreactor scale.

**Group/Team:** Join a multi-disciplinary lab with expertise in biology, bioengineering, materials science and tissue engineering, and a wider multi-lab and industry partner team that is focused on transforming the way we model the vasculature. You will have access to world class research facilities in the Charles Perkins Centre (CPC), the Sydney Nano Institute and the Australian Centre for Microscopy and Microanalysis (ACMM). Opportunities to travel to international collaborating laboratories and national and international conferences.

**Project Details:** This project will develop novel biomimetic *in vitro* models to mimic aspects of the vasculature to understand the interactions and interplay of endothelial cells, smooth muscle cells, inflammatory cells and other blood components.

Utilising cutting edge facilities at the University of Sydney Nano Institute, this multidisciplinary project aims to create microsystems that mimic aspects of the vasculature. Using these microsystems, you will study how variations in cell and material properties, geometries and blood flow dynamics govern cell function, cell-cell interaction and multi-cell type interactions. You will use a wide variety of biological assays and live microscopy to assess these cellular behaviours with state-of-the-art equipment at the CPC and ACMM.

This knowledge will allow interrogation of biological mechanisms of cell interactions, response to variations in flow, modelling of pathological conditions and repair mechanisms *in vitro*, for pre-clinical drug evaluation and in coordination with the wider group, device development and in the long-term, tissue engineering and replacement strategies.

For further information, please contact:

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