**SoMS Hons projects updated for 2022**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Academics | Contact emails | Project Title / Research Area / Thesis Topic | School | Group |
| Prof John Whitelock & Dr Kang Liang  | j.whitelock@unsw.edu.au kang.liang@unsw.edu.au  | The development of an *in vitro* vascular system to test a novel diagnostic for circulating tumour cells. | Graduate School of Biomedical EngineeringChemical & Engineering | Cancer |
| Prof John Whitelock & A/Prof Jelena Rnjak-Kovacina | j.whitelock@unsw.edu.au j.rnjak-kovacina@unsw.edu.au | Proteolytic susceptibility of an extracellular matrix coating to encourage reendothelialization of silk based vascular grafts.  | Graduate School of Biomedical Engineering | Cardiovascular Disease |

**ABSTRACTS**

**The development of an *in vitro* vascular system to test a novel diagnostic for circulating tumour cells.**

This project aims to develop and test a vascular model system based on an antibody conjugated novel biomaterial to diagnose circulating tumour cells. In this project the student will culture endothelial cells and melanoma cells either together or separated by a basement membrane structure and probe the system with monoclonal antibodies specific for either cell type. An antibody specific for the melanoma cell surface marker known as chondroitin sulfate proteoglycan 4 (CSPG4) will be conjugated to a zinc based organic biomaterial. The reactivity of the antibody will be analysed and monitored using cell based immunodetection methodology including immunocytochemistry and FACS in addition to ELISA and Western blotting. These experiments will validate the usefulness of the model system to detect melanoma cells separated by a vascular basement membrane.

**Proteolytic susceptibility of an extracellular matrix coating to encourage reendothelialization of silk based vascular grafts.**

This project is part of a larger project investigating bioactive coatings on silk based vascular grafts and is looking at the potential long-term effects on the biological coating of being exposed to blood flow and vascular cells in the body. It aims to study the proteolytic susceptibility of a basement membrane coating based on perlecan, the heparan sulfate proteoglycan 2 (HSPG2) that has been used as a bioactive to encourage reendothelialization. This project will use epitope mapped monoclonal antibodies to identify protease cleavage sites in a perlecan domain that has an integrin / cell binding site using ELISA and Western blotting. The project will also study endothelial cell adhesion to the perlecan domain before and after protease digestion to ascertain any detrimental effects on the cell binding activity of the perlecan domain. These experiments will provide insights into the ability of the novel silk coating to withstand the action of proteases that are commonly found in endothelial and other vascular cells including circulating inflammatory white blood cells.