Bio-vascular 3D

Cardiovascular disease is a leading cause of mortality and morbidity across the world and according to the world health organisation account for 32% of mortality rate globally. There still remain a need to develop better *in vitro* vascular models that would aid further in-depth understanding of cardiovascular pathogenesis and proposed therapeutic intervention.

This study intends to characterize four novel medically relevant synthetic polymer scaffolds, and one hydrogel, for their biocompatibility and potential application in a tissue engineered blood vessel (TEBV). A primary human endothelial cell line derived from the vein of the umbilical cord (HUVEC), and a human primary smooth muscle cell line obtained from the pulmonary artery (HPASMC) will be used in this study in both static and flow monolayer and co-culture models.

Data obtained so far showed two scaffolds with a similar biocompatibility profile to the control material in the presence and absence of extra-cellular matrix support. While coating of the synthetic polymer with a natural polymer increased cell viability across all scaffolds up to day 10 in both cell lines, the difference was negligible beyond day 10. The rate of migration after a cellular scratch wound, and the intracellular reactive oxygen species activity in the two most bio-compatible scaffolds showed no significant difference from the control material. A viable static co-culture of 4 days was achieved on the two scaffolds.

In conclusion, this study intends to deliver an industrially relevant *in vitro* vascular 3D model for testing medical drugs and devices.

Keyword: Vascular, monolayer culture, TEBV, HUVEC, HPASMC, Co-culture