

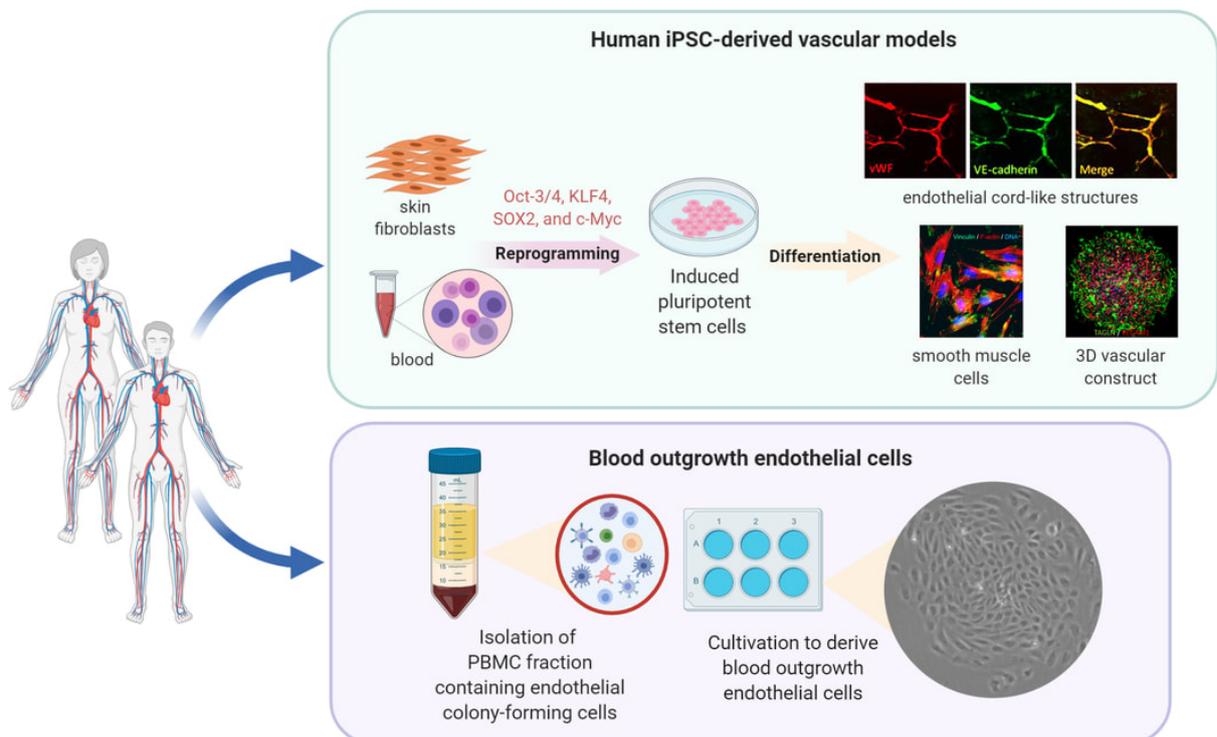
Research

Molecular and Vascular Medicine

Blood vessels transcend all organ systems and underlie the crux of many health conditions. Our research aims to understand biological mechanisms regulating vascular ageing in diseases such as stroke and coronary artery disease. We employ advanced molecular techniques, human-relevant experimental models and patient-derived materials to elucidate pathological endothelial cell behaviours. Our work provides insights for translation to restore blood vessel health and regenerative therapies.

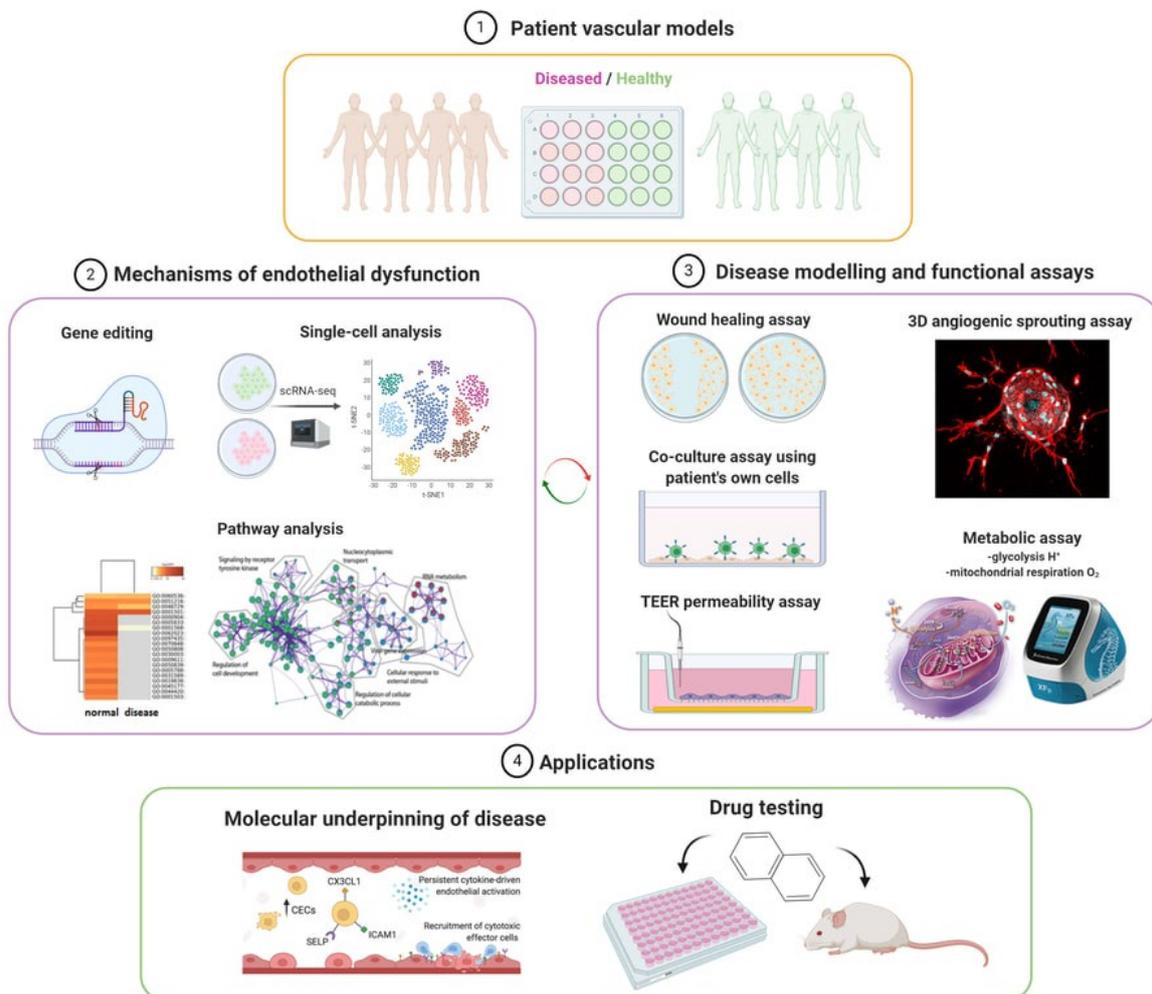
Personalised Vascular Models

Using the human pluripotent stem cell (hPSC) technology, we have invented techniques to derive vascular smooth muscle and endothelial cells, resembling those found in the brain and heart arteries. We also harness the replicative potential of endothelial colony-forming cells found in the blood to generate blood outgrowth endothelial cells. Such resources open the door to creating personalised vascular models that are amenable to gene editing and disease modelling.



Disease Modelling

Human vascular models capture the complex genetics of patients, allowing us to work on the genotype-to-phenotype basis of vascular disease-associated mutations. In addition, there are well-studied morphological, biochemical and phenotypical heterogeneities in our blood vessel system. We perform single-cell analysis to identify unique cell states, as well as to elucidate how transcriptional and epigenetic modulators impact on phenotypic differences between healthy and diseased cells. Our cellular models enable far-reaching experimental strategies e.g. drug testing to facilitate the development of novel therapeutics.



Vascular Disease Biomarkers

Blood borne cells such as circulating endothelial cells and progenitors show characteristic changes in their gene expressions and phenotypes in response to vascular injury. We are developing cell-based biomarkers to predict risk of vascular complications, therefore improving diagnostics for early intervention.