Perfusion optimisation for vascular grafts design used in the treatment of aortic disease

Scott Black (1), Konstantinos Ritos (1), Craig Maclean (2), Robbie Brodie (2), Asimina Kazakidi (1)

(1) UNIVERSITY OF STRATHCLYDE (2) TERUMO AORTIC

Regions of the aortic arch affected by an aneurysm or dissection may require surgical intervention using vascular grafts, which includes a means of re-perfusing the supra-aortic branch vessels. However, graft configuration to ensure optimal post-surgical perfusion is currently poorly understood. Therefore, enhanced understanding of perfusion in patient-specific cases is critical to improving clinical practice and patient outcomes. In this work, a combination of computational and experimental models of the aortic arch were created to investigate the pre-surgical haemodynamics of the aortic arch, using a coupled 3D-0D numerical framework to simulate a range of downstream conditions, both healthy and pathological.

Keywords: aortic arch, patient outcomes, haemodynamics