

## **Computational analysis on upper extremity vein graft: simulation on kinked vein graft**

### **Abstract**

An artery reconstruction in upper extremities is rare performed compared to the artery reconstruction in lower extremities. Primary vascular repair was performed in many cases. As to alleviate vascular occlusion, an interposition vein graft or venous bypass grafting were applied. However, one or more the internal diameters of applied vein graft are blocked or severely narrowed due to the kinking failure on saphenous vein graft. The objective of this study is to investigate the blood flow influence on vein graft with kinking failure. The 3-D computational fluid dynamic method was employed to determine velocity, pressure gradient, resistance of blood flow and wall shear stress on the kinked vein graft. We expect that velocity, pressure gradient, resistance of blood flow and wall shear stress on kinked vein graft to behave non-hydraulically compared to an ideal straight graft. Furthermore, a longitudinal impedance modulus (ZL) is expected to be insufficient due to kinking failure on vein graft.

**Keywords** — Computational fluid dynamic, numerical method, thrombosis, vein graft, kinking failure.