Computational Phlebology: The Simulation of a Vein Valve
GAVIN BUXTON, NIGEL CLARKE, Durham University — We present a three-dimensional computer simulation of the dynamics of a vein valve. In particular, we couple the solid mechanics of the vein wall and valve leaflets with the fluid dynamics of the blood flow in the valve. Our model captures the unidirectional nature of blood flow in vein valves; blood is allowed to flow proximally back to the heart, while retrograde blood flow is prohibited through the occlusion of the vein by the valve cusps. Furthermore, we investigate the dynamics of the valve opening area and the blood flow rate through the valve, gaining interesting insights into the physics of vein valve operation. It is anticipated that through computer simulations we can help raise our understanding of venous hemodynamics and various forms of venous dysfunction.

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