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Modelling and simulation of flow and agglomeration in deep veins valves using discrete multi physics

M. Ariane, W. Wen, D. Vigolo, A. Brill, F.G.B. Nash, M. Barigou, A. Alexiadis



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1 **Modelling and simulation of flow and agglomeration in deep veins valves using**
2 **Discrete Multi Physics.**

3 M. Ariane^{a,*}, W. Wen^a, D. Vigolo^a, A. Brill^b, F. G.B Nash^b, M. Barigou^a, A.
4 Alexiadis^{a,*}

5 ^a School of Chemical Engineering, University of Birmingham, Birmingham, United
6 Kingdom

7 ^b Institute of Cardiovascular Sciences, University of Birmingham, Birmingham, United
8 Kingdom

9

10 **Abstract**

11 The hemodynamics in flexible deep veins valves is modelled by means of discrete
12 multi-physics and an agglomeration algorithm is implemented to account for blood
13 accrual in the flow. Computer simulations of a number of valves typologies are carried
14 out. The results show that the rigidity and the length of the valve leaflets play a crucial
15 role on both mechanical stress and stagnation in the flow. Rigid and short membranes
16 may be inefficient in preventing blood reflux, but reduce the volume of stagnant blood
17 potentially lowering the chances of thrombosis. Additionally, we also show that in
18 venous valves, cell agglomeration is driven by stagnation rather than mechanical stress.

19 **Keywords:** Discrete Multi-Physics, Smoothed Particle Hydrodynamics, biological
20 venous valve, Clot, Deep Venous Thrombosis.

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