Modeling and Simulation of RBCs Aggregation in Cardiovascular Networks

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Abstract

Cardiovascular dysfunctions due to undesirable adhesion among blood elements (like red blood cells-RBcs) are the main causes of mortality in the world. In our study, we intend to develop simple models to better understand the perfusion of blood in microcirculation by considering a complex geometry under several conditions (shear, confinement, pressure, etc.) in the presence of adhesion among RBCs using an immersed boundary-lattice Boltzmann method. Our primary results show that the aggregation of RBCs and their mechanical properties has a strong impact on their distribution in the network. For stiff RBCs (due to a disease) a weak adhesion leads to super diffusion instead of ballistic transport, as compared to the case without adhesion.

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