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A Particle Method Computer Simulation of Blood Flow

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A particle method computer simulation of the blood flow is proposed to directly evaluate mechanical interactions between red blood cells (RBCs) and plasma. A moving particle semi-implicit method was used for flow analysis of blood plasma, and an elastic membrane model for deformation and movement of RBC. A two-dimensional particle model of blood flow between parallel plates was constructed in order to examine the feasibility of the proposed method. Temporal changes in mechanical behavior of RBC were obtained such as movement into downstream direction due to pressure drop of plasma flow and deformation in a parachute shape during the movement. The results corresponded to experimental observations, indicating the validity of the simulation method. The proposed method will give us an insight into the mechanism of the blood flow at from microscopic level of the blood cells and plasma and up to resultant rheological properties.

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