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**Mesoscale Model for Blood Cell Adhesion and Transport using Ellipsoidal Particles** JENNIFER CHESNUTT, The University of Iowa, JEFFREY MARSHALL, The University of Vermont — A novel discrete-element computational model for efficient transport, collision, and adhesion of ellipsoidal particles is applied to blood cells adhering through receptor-ligand binding in three-dimensional flow. The model has been used for simulation of over 13,000 adhesive cells through approximation of blood cells as elastic particles and other physically-justifiable approximations. The computational model is validated against experimental data of red blood cell (RBC) aggregation in shear and channel flows. The structure of aggregates formed by RBCs is analyzed by various measures that relate RBCs which are in contact with each other and that characterize an aggregate by fitting an ellipse to the projection of cells contained in the aggregate. Factors such as shear rate and adhesive surface energy density between cells are examined for their effects on the size and structure of RBC aggregates in both two- and three-dimensional computations. The effect of RBC aggregation on migration of blood elements (RBCs, leukocytes, platelets) in channel flow is also investigated.

Jeffrey Marshall
The University of Vermont

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