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Simulation of neutrophil motion and deformation: Influence of rheology and flow configuration MELANIE LE ROUX, INP IMFT Toulouse, JACQUES MAGNAUDET — We report on preliminary computations of neutrophils (white cells) flowing and deforming in capillary vessels in different flow configurations. We crudely consider that the cell is made of a solid core and a viscoelastic cytoplasm surrounded by an elastic membrane and moves within a Newtonian plasma. A Volume Of Fluid approach is employed to follow the displacement of the cell while the Immersed Boundary Method is used to take into account the presence of a solid core; the viscoelastic behavior of the cytoplasm is mimicked using the Oldroyd-B model. We discuss the behavior of the cell when placed in 3 different flow configurations, namely a four roll-mill device allowing all types of linear flow fields to be generated in the central region where the cell stands, a contraction followed by an expansion in a straight channel, and a periodic network of prismatic blocks. The dimensions of the last two systems are such that the cell experiences large deformations while moving. We discuss the influence of the physical parameters of the system, especially the Capillary and Deborah numbers and the ratio of the inner and outer Newtonian viscosities, on the flow and cell evolution.

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