Abstract Submitted
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Trains of Red Blood Cells in a bi-dimensional microflows.[1] ANNIE VIALLAT, CECILE ISS, DELPHINE HELD, CNRS Aix - Marseille Universit , France, CATHERINE BADENS, Assistance Publique des Hpitaux de Marseille, Dpt de Gntique Mdicale, Aix Marseille Universit, INSERM, Centre de reference thalassemie, ANNE CHARRIER, EMMANULE HELFER, CNRS Aix - Marseille Universit , France, CINAM TEAM, DPT DE GNTIQUE MDICALE TEAM — In the vascular microcirculation RBC distribution is uneven in the direction normal to the blood flow, as first evidenced by the existence of a cell-free layer near the vessel wall. In addition, the most rigid cells such as white blood cells and platelets are known to segregate to the walls while flowing in wide channels. We use microfluidic bi-dimensional channels (60 m wide, 8 m high, 5 mm long) to explore the flow structure in RBC suspensions at several hematocrits, flow rates and RBC rigidities. We observe the dynamical formation of RBC clusters and their motion along the flow direction. We study healthy RBCs, RBCs stiffened with glutaraldehyde, mixture of healthy and stiffened RBCs and RBC from sickle cell patients. Initially dispersed healthy RBCs organize, while flowing along the channel, into series of parallel trains. The train length depends on RBC hematocrit and flow rate. Stiffened RBCs do not cluster and mainly display tumbling motion like rigid disks. They destabilize existing trains and are preferentially observed close to the walls. We compared our results to that observed in microcapillaries, where trains of RBCs entirely fill in width the microchannel (G. Tomaiuolo, L. Lanotte, G. Ghigliotti, C. Misbah, and S. Guido, Phys Fluids, 24, 051903 (2012).

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