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**Physical mechanism of erythrocytes sedimentation rate**[1] ALEXIS DARRAS, THOMAS JOHN, Experimental physics, Univ des Saarlandes, ANIL KUMAR DASANNA, SEMEN BUVALYY, DMITRY A. FEDOSOV, Institute of Biological Information Processing and Institute for Advanced Simulation, Forschungszentrum Jlich, LARS KAESTNER, CHRISTIAN WAGNER, Experimental physics, Univ des Saarlandes — Red blood cells (or erythrocytes) sedimentation rate (ESR) is a physical parameter of blood which is often checked in medical diagnosis. It is indeed well known that in case of inflammation, the increase in fibrinogen and other proteins induces a higher ESR. Until now, researchers thought that the increase of fibrinogen accelerates the ESR by creating bigger aggregates of red blood cells (RBC). Fibrinogen is indeed an aggregation agent of RBCs, and bigger aggregates tend to sediment faster in Stokes regime. However, modeling the ESR measurements with this hypothesis is challenging and often requires physical assumptions specific to this system. Besides, modern colloidal science has shown that attractive particles form percolating aggregates, as wide as the container. The sedimentation of those colloids then follows a so-called "colloidal gel collapse" regime. Here, we show that RBCs actually follow the same behavior. We present details measurements of experimental ESR curves, and original micro- and meso-scopic pictures supporting this claim. Besides, those experimental observations are supported by 2D and 3D numerical simulations. We also demonstrate that such assumption naturally leads to efficient analytical modeling for the sedimentation curve of RBC.

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