

Abstract Submitted  
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**A new look on blood shear thinning** MANOUK ABKARIAN, LUCA LANOTTE, CBS, Montpellier, France, JEAN-MARC FROMENTAL, L2C, Montpellier, France, SIMON MENDEZ, IMAG, Montpellier, France, DMITRY FEDOSOV, GERHARD GOMPPER, JOHANNES MAUER, Research Center Juelich, Germany, VIVIANA CLAVERIA, CBS, Montpellier, France — Blood is a shear-thinning fluid. At shear rates  $\dot{\gamma} < 1s^{-1}$ , its drop of viscosity has been related primarily to the breaking-up of networks of “rouleaux” formed by stacked red blood cells (RBCs). For higher  $\dot{\gamma}$  in the range  $10 - 1000s^{-1}$ , where RBCs flow as single elements, studies demonstrated that RBCs suspended in a viscous fluid mimicking the viscosity of whole blood, deformed into ellipsoids aligned steadily in the direction of the flow, while their membrane rotated about their center of mass like a tank-tread. Such drop-like behavior seemed to explain shear-thinning. Here, using rheometers, microfluidics and simulations, we show that the dynamics of single RBCs in plasma-like fluids display a different sequence of deformation for increasing shear rates going from discocytes to successively, stomatocytes, folded stomatocytes, trilobes and tetralobes, but never ellipsoids. This result is also identical for physiological hematocrits. We correlate this shape diagram to the different regimes in blood rheology for high shear rates and propose a new-look on the interpretation of blood shear-thinning behavior.

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