

# Rheology of Erythrocytes and Platelets

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## ABSTRACT

Blood, consisting of blood cell dispersions in plasma, exhibits various interesting phenomena such as erythrocyte deformation, reversible erythrocyte aggregation and disaggregation and irreversible platelet aggregation. These phenomena directly affect blood viscosity, which is strongly correlated with circulatory diseases. In this presentation, we will introduce general rheology of blood flow with understanding of microrheology of blood. First, erythrocyte deformability is highly dependent the ratio of surface area to internal volume. Any increase of internal volume immediately results in decrease of its deformability. Aged erythrocytes used to have large amount of hemoglobin, which mechanism is still unanswered. Second, reversible erythrocyte aggregation can be described with two models: 1) protein bridging model and 2) protein depletion layer model. The erythrocyte aggregation exhibits two important stresses: one is yield stress and the other is disaggregating shear stress. These two stresses are similar but different. Third, activation and aggregation of platelet is one of the hot clinical issues to prevent major cardiovascular and cerebrovascular diseases. Platelets can be activated with mechanical shear stress and biochemical agonists. Activated platelets tend to adhere on vascular surface and aggregate each other. These sequential processes of platelets may result in serious thrombosis in circulation such as myocardial infarction and stroke. Conclusively, the clinical blood rheology, which has been understood with empirical effort, requires further understanding with help of mathematical analyses.

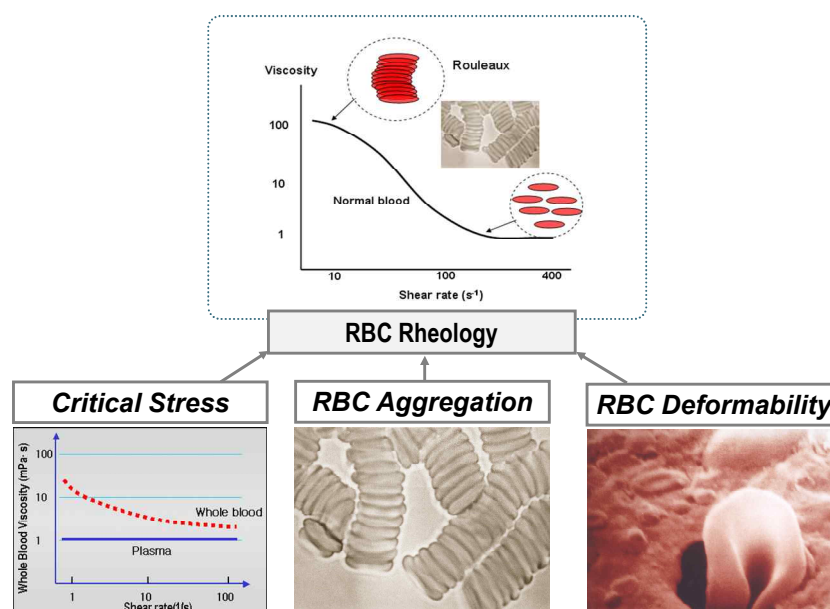


Fig.1 Understanding of blood rheology with various microrheological phenomena of blood