

Optical assessment of interrelation of red blood cells and platelets aggregation in blood of patients suffering from arterial hypertension

Andrei Lugovtsov*, Danila Umerenkov, Petr Ermolinskiy, Alexander Priezzhev

Faculty of Physics, M.V. Lomonosov Moscow State University

*anlug1@gmail.com

Blood microrheology depends on many factors, in particular, the properties and constituent components of blood plasma and the interaction between blood cells resulting in red blood cells (erythrocytes) aggregation (EA) and platelets aggregation (PA). Cells aggregation mostly determines the viscosity of blood and, finally, blood microcirculation that in turn determines the perfusion of body tissues, hemostasis, the quality of nutrient transportation, etc. Determining the aggregation blood status of an individual should become a part of his/her medical examination, in particular under such socially important disease as arterial hypertension (AH). The goal of this work was to establish correlation between EA and PA parameters measured *in vitro*. We used diffuse light scattering, laser tweezers, and turbidimetry to characterize the cells aggregation processes in blood samples. The process of PA was registered by aggregatograms (the dependences of light transmittance intensity on time) and adenosine diphosphate was used as the PA inducer. For obtaining the EA parameters, the aggregation and disaggregation kinetics (the dependences of scattered light intensity on time) were registered. For assessing the forces of paired RBC interaction we used the optical trapping technique. The measurements with venous blood samples obtained from 48 patients suffering from AH and 10 volunteers were performed. We found the existence of correlation between the degree of PA and EA aggregation indices (Pearson correlation coefficient $R_{\text{Pearson}} = 0.32$), the degree of PA and the characteristic time of EA ($R_{\text{Pearson}} = -0.34$), the maximum rate of PA and the EA index ($R_{\text{Pearson}} = 0.37$) and others. The strength of RBC aggregates does not correlate with parameters of PA. The data obtained indicate the relationship between the processes of EA and PA. This work was supported by the Russian Science Foundation grant No. 22-15-00120.