

Type: invited presentation

Blood microrheologic parameters measured before and after therapeutic plasmapheresis

Andrei Lugovtsov¹, Petr Ermolinskiy¹, Nickolay Kalinin², Irina Tauson², Maria Rudnitskaya², A.V. Priezzhev¹

¹Physics Department of M.V. Lomonosov Moscow State University, Moscow, Russia

²Medical Research and Education Center of Lomonosov Moscow State University, Moscow, Russia

Methods based on the use of diffuse elastic light scattering and diffractometry are widely used to measure several parameters that characterize the microrheological (MR) properties of blood [1]. The state of the body/organism depends on the MR properties of erythrocytes and platelets - their deformability and aggregation. The importance of monitoring these properties is determined by the need to correct them with the use of various drugs or with the help of drug plasmapheresis procedures. The procedure of therapeutic plasmapheresis is a method of extracorporeal hemocorrection aimed at changing the qualitative and quantitative composition, correcting the physicochemical state of the blood, remove pathogenic substances from the circulating bloodstream, normalize the immune response. So far there is no information about the effect of plasmapheresis on blood MR properties. The paper demonstrates the physical foundations of the laser-optical methods used. The results of in vitro measurements of the indices of erythrocyte deformability, aggregation of erythrocytes and platelets, hydrodynamic strength, characteristic time of formation of erythrocyte aggregates before and after the procedure of plasmapheresis are presented. A significant increase in platelet aggregation, a decreasing of erythrocyte aggregation, and a slight decrease in the deformability of erythrocytes were found. This work was supported by the Russian Science Foundation grant No. 22-15-00120 and performed within the framework of the Interdisciplinary Scientific and Educational School of Moscow University «Photonic and Quantum technologies. Digital medicine».

[1] A. E. Lugovtsov, Y. I. Gurfinkel, P. B. Ermolinskiy, A. I. Maslyanitsina, L. I. Dyachuk, A. V. Priezzhev, *Biomedical optics express*, **2019** 10(8), 3974–3986.