THE INFLUENCE OF THE NEAR INFRARED RADIATION ON THE ERYTHROCYTE MECHANICAL PROPERTIES IN THE MICRO- AND MACRO- SCALE

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Interaction between blood and dialysis membranes results in several bioincompatible events during hemodialysis. Erythrocytes from hemodialysis patients have increased levels of MDA and decreased levels of vitamin E. In addition, erythrocytes from uremic patients have a shortened life span with respect to healthy control. Changes in osmotic fragility are also more common in hemodialysis patients. In our papers we reported effects of NIR irradiation (*in vitro*) on erythrocytes. The changes of membrane structure and polarity, shape and viscoelastic properties of erythrocyte cells were monitored. Irradiated RBCs unify their osmotic properties, and improve viscoelasticity properties. Our experiments show also the protective action of NIR radiation against oxidative stress. Thus we postulated the usefulness of NIR as a protective factor for red cells during haemodialysis and transfusion.

   The present studies examine the influence of NIR on the RBC's viscoelasticity and test the improvement of their mechanical properties using a model of dialyzer constructed by us. We studied the RBC deformability under controlled shear stress. The deformabity was measured as a mobility of spin probes localized:
1.   **at different depths of the lipid bilayer (5-Doxyl and 16-Doxyl stearic acid),**
2.   **adsorbed in the glycocalyx area (4-amino TEMPO),**
3.   **dissolved in plasma (TEMPO-spin probe).**

   While overall viscosity on the shear of full blood diminishes, while the response of erythrocytes membranes depends on the localization of the spin probes. Subsequently, NIR irradiated erythrocytes were circulated in the model of dialyser with flow rate 250 ml/min for 1 h. The erythrocyte mechanical damage was tested by means of autohaemolysis ratio. The obtained results showed that the Near Infrared Radiation treatment can decrease autohaemolysis.