ANALYSIS OF THE EFFECT OF MAGNETOSTIMULATION ON THE VISCOELASTIC PROPERTIES OF BLOOD IN PATIENTS WITH LASTING PAIN

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The aim of the current work was the analysis of the influence of alternating magnetic field on the viscoelastic properties of blood in vivo in patients with lasting pain problems. Blood, as a suspension of morphotic elements in plasma, constitutes a fluid of very complex rheological properties. Blood flow in the circulatory system depends both on many phenomena resulting from its structure and properties and on physical and physico-chemical properties of blood. The main factors influencing the rheological properties of blood are: hematocrit, plasma viscosity, whole blood viscosity, red cells aggregability, deformability and ability to orient in the flow. Oscillatory techniques, also called dynamic mechanical analysis, have been used in the current work to study the visco-elastic properties of blood. The blood samples were collected from patients of a neurological warp complaining about spinal cord and lower limbs pain. Altogether 25 patients at the age of 44 to 75 (average 57) took part in the study. A blood sample was collected from each patient twice: before the magnetostimulation and after five treatments. For each blood sample the hematocrit value was measured using the standard method. Plasma viscosity and complex whole blood viscosity were measured by means of a rotary-oscillating rheometer Contraves LS40. Magnetic field was generated by the instrument Viofor JPS and the magnetostimulation treatments were performed using different programs. The analysis of the results included estimation of the hematocrit value (Hct), plasma viscosity (η_p), complex whole blood viscosity (η^*) and its components: viscous (η') and elastic (η'') viscosity at four chosen amplitudes of the shear rate as a function of applied treatment program. Plasma viscosity values were obtained from the shear rate dependence of shear stress using the linear regression method. The results obtained in the study suggest that the blood rheological properties change in accord with applied magnetostimulation program.

Keywords: hemorheology, blood viscosity, complex viscosity, rotational measurements, oscillatory measurements