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## **INTRAVENOUS LASER BLOOD IRRADIATION OF DIABETES MELLITUS PATIENTS**

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*In vivo* low intensity laser irradiation effect on blood of II type diabetes mellitus patients was studied. Healthy people ( $n=16$ ) without chronic disease at the age of  $50.19\pm 8.45$  (I control group) and patients with II type DM ( $n=16$ ) at the age of  $56.86\pm 6.84$  (II group) took part in the research. It shows that intravenous laser blood irradiation leads to the normalization of glucose level in II type DM patients decreasing its concentration to 12.1 % ( $p=0.02$ ), decrease in total protein to 2.98 % in healthy people ( $p=0.11$ ) and 2.83 % in II type DM patients ( $p=0.02$ ), correction of cholesterol level that decreases by 6.88 % in healthy people ( $p=0.26$ ) and 5.72 % in II type DM patients ( $p=0.02$ ). Application of 7–8 sessions of intravenous laser blood irradiation has a beneficial effect on blood indications both for healthy people and II type DM patients.

**Keywords:** low intensity laser irradiation, helium-neon laser, photohematotherapy, phototherapy, intravenous laser blood irradiation, diabetes mellitus.

The therapeutic application sphere of low intensity laser irradiation is constantly expanding empirically. Optic irradiation effect on blood, called photohemototherapy, is a fast progressive field in advanced medicine successfully developing in the XX century. However, despite the undoubted success, the results, obtained by various authors, are difficult to generalize due to their variety, and therapeutic result prediction is difficult because of the absence of science-based criteria for successful method application: the way of its effectiveness assessment for some patients, monitoring methods of individual susceptibility to phototherapy. The analysis of the effect result of low intensity laser irradiation on blood and oxygen-dependent processes in a patient's body is a primary practical value for photohemototherapy. It should be marked that study of the patterns of blood photo modification and its influence on metabolic processes has great practical meaning not only for II type diabetes mellitus treatment, practiced application methods and gained clinical results open up the opportunity for its use in the treatment of oxygen deficiency caused by coronavirus infection.

*The research purpose* is to study low intensity laser irradiation in the correction of glucose level, total protein, albumin, blood cholesterol in people being examined with II type diabetes mellitus.

The practical part of the research was carried out based on the Republican Research and Clinical Center of Neurology and Neurosurgery approved by the Ethics Committee. 32 patients took part in the research. Healthy people ( $n=16$ ) without chronic diseases at the age of  $50.19\pm 8.45$  were in the I group; patients with II type diabetes mellitus ( $n=16$ ) at the age of  $56.86\pm 6.84$  were in the II group.

Blood ( $V=3$  ml) for research was taken twice by venipuncture method: before intravenous laser blood irradiation (between 8 and 9 o'clock) before physical activity and a provision of diagnostic procedures, after intravenous laser blood irradiation into vacutainers with EDTA. The irradiation course ranged from 7 to 8 20-minutes procedures. Laser irradiation was conducted with the help of helium-neon laser «LYUZAR-MP-K». The facility provides continuous radiation action at wavelength  $\lambda=0.67\pm 0.02$   $\mu\text{m}$ , output capacity at the end of the light-guide 3 mW. Blood analysis was conducted at biochemical automated analyzer Olympus AU 400 (the USA), the analyzer of glucose and lactate Biosen EKF Diagnostic (Germany).

Helium-neon laser irradiation contributes to enzymatic metabolic shifts of hemic protein and accelerated elimination of their products from the body. Energy transfer from major chromophores of the helium-neon laser along the metabolic chain increases the number of heme-containing components, and also it leads to a decrease in the permeability of erythrocyte membranes and their aggregation ability due to decrease polarization of their membranes.

It is revealed that intravenous laser blood irradiation influences carbohydrate metabolism indicators normalizing glucose level in II type diabetes mellitus, reducing its concentration by 12.1 % ( $p=0.02$ ).

It is proved that protein metabolism indicators (total protein level) change under low intensity laser irradiation, it reduces total protein level by 2.98 % in healthy people ( $p=0.11$ ) and by 2.83 % in II type diabetes mellitus patients ( $p=0.02$ ).

It is shown that there is a possibility of cholesterol level correction under low intensity laser irradiation: it reduces by 6.88 % in healthy people ( $p=0.26$ ) and by 5.72 % in II type diabetes mellitus ( $p=0.02$ ).

Therefore, the application of 7-8 intravenous laser blood irradiation sessions is beneficial for blood indicators both for healthy people and II type diabetes mellitus patients. It proves the reasonableness of the application of such a procedure for the correction of carbohydrate, lipid, and protein metabolism in all groups.

Thus, there are change patterns of intensity parameters of protein and lipid metabolism under influence of helium-neon laser irradiation at wave-length 632.8 nm in II type diabetes mellitus based on physiological principles, contributing to total protein concentration reduce by 2.98 % in healthy people and by 2.83 % in II type diabetes mellitus, cholesterol reduce by 6.88 % in healthy people and by 5.72 % in II type diabetes mellitus. The possibility of glucose level correction in blood with II type diabetes mellitus is determined based on low intensity laser irradiation that helps to reduce glucose concentration level by 12.1 %.

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### SECTION 3

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