

BELARUSIAN STATE UNIVERSITY

Establishment of Education
«International Sakharov Environmental Institute»



**ACTUAL ENVIRONMENTAL
PROBLEMS**

**Proceeding of the VII International
Scientific Conference of young scientists,
graduates, master and PhD students**

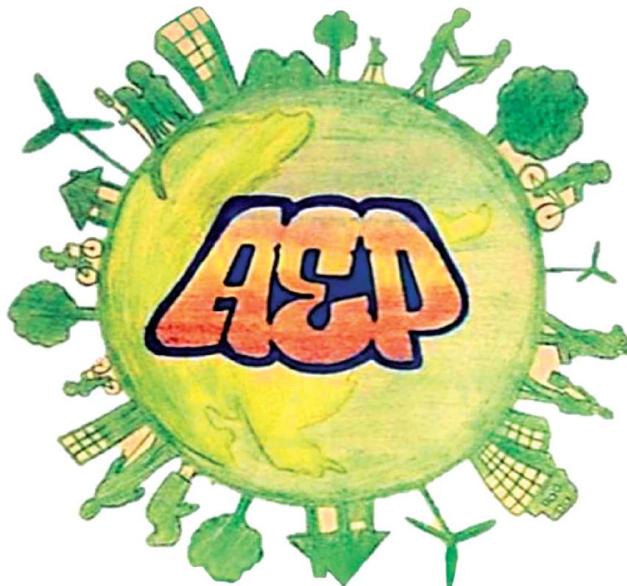


November 23–24, 2017
Minsk, Republic of Belarus



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GLUCOSE LEVEL CHANGES IN PATIENTS WITH DIABETES MELLITUS AND IN HEALTHY INDIVIDUALS UNDER THE INFLUENCE OF LOW-LEVEL LASER THERAPY

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This research is devoted to the study of changes in glucose levels in patients with diabetes mellitus and in healthy individuals under the influence of low-level laser therapy (LLLT). It is shown that LLLT is an important component of therapy in the treatment of type 2 diabetes, since it favorably affects the biochemical parameters of blood and increases the resistance of the organism to unfavorable factors.

Keywords: diabetes mellitus, hyperglycemia, low-level laser therapy.

Type 2 diabetes mellitus (DM) is a chronic metabolic disorder in which prevalence has been increasing steadily all over the world. Diabetes is characterized by a chronic hyperglycemic condition resulting from insufficient action of insulin[1].The main complications of this disease are damage to kidney, blood vessels and eyesight, nervous system disturbance. Abovementioned complications may lead to disability, therefore the search for new ways of treatment and reduction of complications threat level are relevant objectives at the moment. In this regard the top-priority is the choice of treatment which has a many-sided effect on the human body. One of these methods is the low-level laser therapy (LLLT).

Low intensity laser therapy is referred to electromagnetic radiation of optical range. The helium-neon laser radiation has a low radiant power – up to 20 mW with a wavelength equal to 630 nm capable of affecting trigger mechanisms of cellular regulation, changing cell membrane condition by the increase of cells functional activity, changing of metabolic processes, stimulating of microcirculation and oxidation-reduction processes, as well as increasing the human body tolerance. At the same time laser radiation has not so many contraindications, which include eideosyncrasy, febricity, presence of benign or malignant tumors.

Currently there is no consensus on laser impact on the human body, its separate systems and abnormal focus. It is assumed that the variability and systematic nature of secondary biochemical and physiological effects of LLLT on blood is explained by the variety of photoacceptors and primary photobiological reactions implemented on different levels. Laser interaction with a biological object includes the following stages: light quantum absorption and intramolecular energy redistribution (photophysical processes), an intermolecular energy transfer and primary photochemical reactions, biochemical processes involving photoproducts, secondary photobiological reactions and the body's general physiological response to the effect of light [2].

To study the effect of LLLT on blood glucose values, 32 patients were included in this study. Group I included the patients who didn't have type 2 diabetes – 16 people (50 %) of the average age of $50,18 \pm 8,4$ years. The second group consisted of patients with type 2 diabetes of the average age of $56,87 \pm 6,83$ years. Serum samples of venous blood were analyzed before and after the effects of LLLT in healthy individuals and in patients with type 2 diabetes.

Statistical analysis was performed using the R programming language and Microsoft Excel table processor. Varying quantitative indicators of the results of the studies were subjected to statistical treatment, with an assessment of the reliability of the effects using Student's t-test. The difference was considered to be reliable for $p \leq 0,05$ [3].

In patients with type 2 diabetes after LLLT use, the blood glucose level was reliably reduced ($p = 0,028$), the baseline level was $7,715 \pm 2,23$, the post-procedure glucose level was $6,78 \pm 1,39$. Accordingly, in healthy patients such differences in the level of glucose before and after the effects of LLLT was not observed and corresponded to the value ($p = 0,76$). Thus, one can draw a conclusion about the favorable effect of the procedure on the body of patients with type 2 diabetes.

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