

In the offices of megavoltage therapy, remote gamma therapy, intracavitary gamma therapy and contact radiation therapy, stationary dosimeters such as DKS-AT1119 and CPK-AE2327 are installed for constant monitoring.

IMPACT OF LASER IRRADIATION OF LOW INTENSITY ON HEMOGLOBIN

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Laser or optical quantum oscillator is a device that converts pump energy (light, electric, thermal, chemical, etc.) to the energy of a coherent, monochromatic, polarized and narrowly directed radiation flux.

The physical basis of the laser is the quantum mechanical phenomenon of stimulated (induced) radiation. The laser irradiation can be continuous, with a constant power, or pulsed, reaching extremely high peak powers.

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According to its properties, laser irradiation refers to coherent monochromatic polarized electromagnetic radiation. The spectral characteristic of laser irradiation, or the length of its wave, is the most important indicator, which determines the biological effect on tissues and the body.

The main absorbing component in the irradiation of biological tissues by the laser is blood, which concentration of energy absorption is several times higher in the muscle tissue and tens of times in the physiological solution, and the acceptor factor of the laser irradiation is mainly in the hemoglobin of erythrocytes, which performs the most important function of the transport of oxygen to the tissues of the body.

The mechanism of action of low-level laser irradiation (LLLI) for homeostasis has been studied in terms of its activation by the oxygen-binding function of hemoglobin and the further transportation of oxygen to tissues, which will increase the compensatory functions of the organism both in the aspect of healing post-operative wounds, and, possibly, in increasing the overall status of homeostasis.

Hemoglobin as the main source of the oxygen transport function of blood undergoes a number of changes under the influence of a helium-neon and semiconductor laser.

Oxygenation of hemoglobin is connected with the changes in the membrane of erythrocytes under the effect of the laser irradiation, which increases its permeability for the ions and the gases.

An increased degree of oxygenation of erythrocytes is associated with a complex mechanism of regulation of the fermentative and antioxidant complexes.

Low-energy laser irradiation has become widespread in various fields of biological sciences due to the fact that primary photobiological reactions cause various biochemical and physiological responses in the body.

As we know, one of the methods of laser therapy is laser hemotherapy, which includes Intravenous Laser Blood Irradiation (ILBI) and transcutaneous laser blood irradiation (TLBI).

The use of ILBI makes it possible to reduce the periods of treatment, to increase the time of remission, to stabilize the course of diseases, to reduce a quantity of postoperative complications, etc

However, the universality of the biological effect of LLLI, and of the ILBI method in particular, is due to the influence on the lower (subcellular and cellular) level of regulation and maintenance of homeostasis; the influence of LLLI also corrects the strategy of adaptation (physiological reactions) of a higher level of living organization as the disturbances of these mechanisms are the true cause of many diseases.

Laser technology is applicable for objects from a wide variety of materials located in various aggregate states, among which the most interesting and complex are the biological ones.

At the present time, there is an intensive introduction of laser irradiation in biological research and in practical medicine in most countries of the world. The unique properties of laser irradiation have revealed wide possibilities of its application in different fields of medicine: surgery, therapy and to diagnostics.