

## DEVICE FOR MANAGED IRRADIATION OF BIOLOGICAL TISSUES

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Reducing the duration of post-operation regeneration, namely biological tissues regeneration – is a permanent concern for practical medicine, as well as for fundamental science. Both of them are trying to reveal general regularities of regeneration process. Actual and previous research confirm the need for application of irradiation within a large range of wavelengths, which can elucidate this vitally important for the human body process. [1,2]

Device for controlled irradiation of biological tissues performs the following requirements:

- Possibility of choosing the power of irradiation within wide limits;
- Possibility of setting the duration of irradiation procedure;
- Possibility of setting the regime of irradiation (with constant power level, with variable power level);
- Possibility of programming the procedure beforehand, which gives the opportunity to use the device without human participation.

Developed device allows in a user-friendly mode to select irradiation intensity, duration of procedure, calculates the dose of emitted energy and measures the temperature of the irradiated surface using contactless pyrometric method.

As a light-emitter LED are used. This allows to make the device more compact, lightweight and economical. Also, the possibility of LED-panel replacement. Thereby user gets an opportunity of changing the panels from a big range of LED- matrices with different wavelengths. Moreover, it is not necessary to change the module of control and power supply unit, changing the light-emitting panel.

Now, two wavelength modules are available to the user (950 nm and 650 nm, red and infrared parts of the spectrum). Panels have the area of 105 cm<sup>2</sup>, and radial intensity 1 W/sr.

On the basis of the optical model of skin tissue, the distribution of absorbed light power by unit volume of tissue and blood, were calculated conditions for multiple power distribution for different structural tissues and biophysical parameters. Modeling is based on the equation of radiative transfer. The modeling results show that it is possible to control the amount of energy absorbed at different depths of bio tissue by selecting an appropriate wavelength of radiation. This can be used for selectively and directed to certain depths influence, thereby increasing the efficiency of the procedure.

Results of studies of the irradiation effect on biological tissues showed that low-level light therapy of red and infrared spectrum accelerates the process of tissue regeneration, reduces the rehabilitation and contributes to wounds cicatrisation.

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