

INFLUENCE THE REFRACTIVE INDEX OF BIOLOGICAL TISSUE ON THE LIGHT SCATTERING INDICATRIX

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In conducting laser therapy procedures, on the one hand the energy parameters of the laser should ensure a harmless effect on the body, and on the other hand this energy should be sufficient to activate the necessary processes of vital activity. The absorption of laser radiation by biological tissues is the main therapeutic effect, which may be accompanied by heat release. In turn, the heating causes a change of refractive index of the tissue. Therefore, it is important to investigate this factor using computer simulation the nature of the interaction of laser radiation with the human body.

In this study, an estimation of the influence of the index of refraction of biological tissue on the indicatrix of laser scattering is carried out. The simulations were carried out using the Monte Carlo method for a sample of porcine muscle with appropriate optical properties [1,2]. The values of the refractive index varied in the range 1.40–1.45 with a step of 0.005 (fig.1).

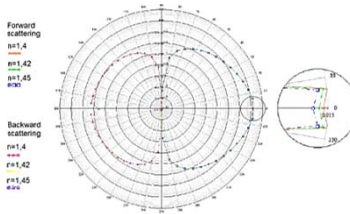


Fig. 1. Laser radiation scattering indicatrix

Based on the obtained data we can conclude that the deviation of the refractive index makes an unnoticed effect on the spatial distribution of scattered radiation, but it makes quite a noticeable effect on the collimated component of forward scattering. This can be applied in the study of the depth of penetration of laser radiation deep into the biological tissue.

References

1. Bezuglyi M., Bezuglaya N., Viruchenko A. On the Possibility of Ellipsoidal Photometry and Monte Carlo Simulation to Spatial Analysis of Biological Media / IEEE 37th International Conference on Electronics and Nanotechnology. – 2017. – №37. – P. 321–324.
2. Безугла Н. В., Безуглий М. О., Тимчик Г. С. Шаргородський В. А. Просторова фотометрія біологічних середовищ // Оптико-електронні інформаційно-енергетичні технології. – 2015. – №2 (30). – С.40–49.
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