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Simulation of thermal interaction of laser radiation with biological teeth's tissue

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Mathematical model and algorithm of the temperature field distribution in complex multilayer biological tissues taking into account their heterogeneous characteristics and features of the absorption and scattering under interaction of laser radiation have been developed [1, 2]. The distribution of radiation intensity during the propagation through scattering biological environment is simulated by Monte Carlo method. A finite- difference method has been used calculating of the temperature fields. In the model, the main attention is paid to the intensity distribution of laser radiation in the dentin - enamel system taking into account the complex structure of dentin, which consists of a set of dentinal tubules (microcapillaries with cross section 3 μm) and which are intertubular environment. The changes optical parameters of absorption (μα) and scattering (μs) of the intertubular environment and the wall and internal core of the microcapillaries are taken into account [3]. The results of modeling of interaction of the Er:YAG Laser (λ=2.94 μm) with biological teeth's tissue are presented.

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2. *Kimura Y., Yonaga K., Yokoyama K., Kinoshita J., Ogata Y., Matsumoto K.* Root Surface Temperature Increase during Er:YAG Laser Irradiation of Root Canals // Journal of Endodontics. – 2002. – 28, N 2, - P. 76–78
3. *Golubenko I.V.* Mathematical model of the propagation of light in the microcapillaries of biological tissues // Opticheski Zhurnal. – 2005, - **72**, N 29.–P. 35