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Simulation of thermal reaction of biological tissues to laser-induced fluorescence and photodynamic therapy

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The aim of this work was to evaluate the temperature fields and the dynamics of heat conduction into the skin tissue under several laser irradiation conditions with both a pulsed ultraviolet (UV) laser ($\lambda=337$ nm) and a continuous-wave (cw) visible laser beam ($\lambda=632.8$ nm) using Monte Carlo modeling. Finite-element methodology was used for heat transfer simulation. The analysis of the results showed that heat is not localized on the surface, but is collected inside the tissue in lower skin layers. The simulation was made with the pulsed UV laser beam (used as excitation source in laser-induced fluorescence) and the cw visible laser (used in photodynamic therapy treatments), in order to study the possible thermal effects.

Biography

A Seteikin studied Physics at the Pedagogical University in Blagoveschensk. He has received his PhD in Physics in 2000. Currently, he is a Professor at the Department of Physics of the Amur State University in Blagoveschensk. His scientific background is in the field of Laser - Tissue Interaction and Biophysics. In his work, he is using experimental and computational techniques. He has national and international collaborations in Physics and Life Science research.

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