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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.

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