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Original article

Effect of laser wavelength on liver tissue thermal damage in laser induced interstitial thermotherapy

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Abstract

In the current work, the finite element method (FEM) has been used to predict the damage zone in tissue subjected to laser in laser induced interstitial thermotherapy(LITT). The effect of laser wavelength on thermal damage zone in this technique has been predicted using FEM. It is found that at 850 nm laser wavelength, the damage zone reached its maximum value comparing with other wavelengths. A computer program written in Visual Basic language has been created to solve the problem following FEM procedure. The created program has been verified by comparing its result with that published elsewhere. The simulation depends on bio-heat equation together with liner laser source which was used to simulate heat transfer through tissue depending on its optical and thermal properties where the temperature distribution is obtained from which one can predict the damage zone based on Arrhenius equation assume optical and thermal tissue properties are function of temperature and an iteration solution was carried out to successfully model their variation and their effect on the result.

Key words: LITT, Thermal damage, LASER

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