A Model to Simulate Laser Ablation in Tumor Using Dynamic Photothermal Coupling Interaction Model

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Abstract

Laser immunotherapy (LIT) was developed to treat late-stage, metastatic cancers through local laser irradiation and immunological stimulation. In ILIT, the photothermal effect induces immune responses by destroying and interrupting tumor cells through temperature elevation in target tissue. Tumor is rich in vasculartur e, and plays a critical part in photothermal effect. Vascularized tumour grown within in a vascularized tissue displays a characteristic compartmentalization into essentially three regions: highly vascularized tumour, well-vascularized tumour and poorly vascularized tumour. In a new model, size, shape, micro-vascular density and blood flow distribution of the different compartments of the tumour (perimeter, periphery and centre), geometric properties of the tumour vasculature are considered. The model is closer to the clinical practice. Thus, the model has a potential application for predicting the photothermal effect of tumor.