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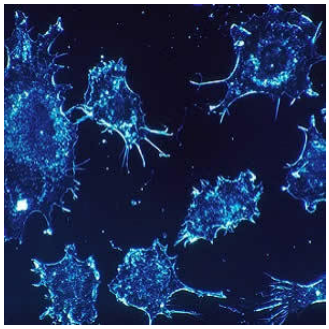
ThOR Protects Healthy Tissues During Freezing of Cancer Lesions



An article appearing in the *Journal of Biomedical Optics*, which is published by the International Society for Optics and Photonics (SPIE), reports that a minimally invasive technique may now be used to target and kill cancer cells with freezing temperatures while protecting adjacent healthy tissues.

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Cryotherapy has been extensively used to treat internal and external cancer lesions. Its benefits include fast recovery, low toxicity, minimal anaesthesia and low cost. One of its disadvantages, however, is that it damages healthy adjacent tissues. Until now, there were no efficient methods for monitoring temperatures in real time in order to avoid damaging non-targeted tissues. Elena Petrova, of TomoWave Laboratories, Inc. (Houston, Texas), and colleagues describe a new technique for monitoring temperature that addresses this problem. More specifically, they propose an optoacoustic (OA) temperature-monitoring method for non-invasive real-time thermometry of vascularised tissue during cryotherapy.

The researchers employed the universal temperature-dependent OA response (ThOR) of red blood cells (RBCs) in order to convert reconstructed OA images to temperature maps. They measured ThOR of ten porcine blood samples in the range of temperatures from 40°C to -16°C and analysed the data for single measurement variations, in order to obtain the temperature calibration curve for intensity-normalised OA images. The morphology of RBCs was examined before and after the data collection. For temperatures below 0°C, which are of particular interest for cryotherapy, the accuracy of a single temperature measurement was ±1°C, which is consistent with the clinical requirements.

"The technique is potentially useful in real-time OA-based temperature measurements during cryotherapy procedures. The investigators have performed “systematic and meticulous studies to validate this temperature measurement approach in tissue-mimicking phantoms", said associate editor Bahman Anvari, University of California, Riverside, United States.

The proposed technique prevents non-cancerous tissue from being destroyed or damaged through careful monitoring of tissue temperatures during cryotherapy procedures and provides an important step towards future non-invasive temperature monitoring in live tissues.

Source: Journal of Biomedical Optics
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Published on : Sat, 12 Nov 2016