

AbstractID: 14547 Title: Monitoring Tumor and Normal Tissue Response in Radiotherapy: Application of Quantitative Ultrasonic Imaging

Radiation therapy, either alone or in combination with surgery and chemotherapy, is a powerful tool in cancer treatment. An estimated half of all newly diagnosed cancer patients receive radiotherapy for tumor control. With recent advances in technology, great focus has been placed on optimizing radiation treatment techniques to reduce normal-tissue effects. We have investigated noninvasive quantitative ultrasound to assess tumor as well as normal-tissue response in cancer radiotherapy. Ultrasound is safe, noninvasive, cost-effective and widely-accessible making it well-suited for clinical implementation. Our ultrasound technique combines conventional B-mode ultrasound with ultrasonic tissue characterization (UTC), which can measure changes in tissue microstructures, to objectively assess radiation-induced changes to the targeted cancerous regions and the surrounding normal tissues. In a breast-cancer radiotherapy study, we demonstrated its capability in measuring radiation-induced acute and late toxicity in the skin and subcutaneous tissues. In this presentation, we report its applications in breast, prostate, as well as head and neck cancer radiotherapy. Such information is important for evaluating the therapeutic ratio. Physicians will gain a better understanding of individual patient's radiation response and therefore, be able to design personalized treatment regimens.

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