

Oncology-Basic Science: Therapy, Metrics & Intervention

Therapy, Metrics & Intervention Posters

Choline molecular imaging with PET for photodynamic therapy of cancer

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Objectives: Photodynamic therapy (PDT) is an emerging therapy for treating various cancers. This study is to develop choline imaging as an early biomarker for monitoring tumor response to PDT at cellular and molecular levels.

Methods: PC-3, a cell line derived from a human prostate malignant tumor, was injected intradermally on the back flanks of athymic nude mice. Two tumors were initiated on each mouse. One was treated and the other served as the control. A second-generation photosensitizing drug Pc 4 (0.6 mg/kg body weight) was delivered to each animal by tail vein injection 48 hours before laser illumination (672 nm, 100 mW/cm², 150 J/cm²). A small animal microPET scanner was used to acquire dynamic images from each mouse before PDT and 24-hr and 48-hr after PDT. ¹¹C-choline was synthesized for the imaging study. Time activity curves and standard uptake values were computed for each tumor.

Results: For the treated tumors (N=12), the choline uptakes significantly decreased 24-hr and 48-hr after PDT, compared to those pre-PDT. However, the uptakes of the control tumors (N=12) significantly increased 24-hr and 48-hr after PDT. Histologic analysis showed that PDT-treated tumors demonstrated apoptosis, necrosis and inflammation that were not seen in the control.

Conclusions: Changes in tumor choline uptake detected by PET imaging provide an assay that could be useful for clinical monitoring of photodynamic therapy of prostate cancer at an early stage.

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