AbstractID: 1810 Title: Evaluation of a prototype MR-guided laser induced thermal therapy device for prostate ablation

PURPOSE- To explore the feasibility of using a prototype magnetic resonance guided laser induced thermal therapy device for *in vivo* thermal ablation of focal tumors in prostate using a canine model.
MATERIALS- Transmissible venereal tumors were inoculated into the prostates of dogs. Animals were anesthetized and placed supine in a 1.5T clinical scanner. An actively cooled diffusing tip laser fiber (980 nm) was placed interstitially into the prostate using T1-weighted and T2-weighted MRI for guidance and verification. Planning images were downloaded onto a PC workstation designed to control the application of laser energy in real-time via MR temperature imaging (MRTI) feedback. Critical structures, such as the urethra, and the target ablation volume were prescribed on the PC workstation. MRTI were acquired every 6 seconds and temperature data displayed on the workstation. Post-treatment MRI was used to assess thermal damage. Animals were sacrificed within 24 hours of treatment for pathological assessment. Post-treatment imaging and pathology results were correlated with thermal dosimetry.
RESULTS- Treatments generated <1.5 cm diameter ablation zones with sharp borders without tissue charring or damage to the fiber tip. MRTI feedback control provided by the system generated thermal dose profiles that agreed with post-therapy imaging results and histology. The system shutdown automatically when temperature thresholds were exceeded.
CONCLUSIONS- Using the prototype device, laser induced thermal therapy can be delivered to the prostate under MR guidance in a safe and efficient manner demonstrating the feasibility of a closed loop thermal therapy system.
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