AbstractID: 6565 Title: Multi-electrode current source interstitial hyperthermia (MECS-IHT) combined with external beam radiotherapy for locally advanced prostate carcinoma: feasibility study

Purpose: The feasibility of 3-D spatially controlled interstitial hyperthermia using the MECS-IHT system for the treatment of prostate cancer has been investigated.

Methods: Patients with prostate cancer stage $T_3N_xM_0$ are treated with a combination of external beam radiotherapy and interstitial hyperthermia. In the last week of treatment one hyperthermia treatment is performed followed by one 4 Gy irradiation fraction. Using the guidance of transrectal ultrasound, 10 to 16 (15G) needles are positioned in the prostate through a template, spacing 10 to 15 mm. Closed-end catheters are inserted through the needles. Heating applicators, 2 electrodes per probe, are positioned in each catheter. Extensive 3-D thermometry (70 to 100 sensors) is performed from within the MECS probes for online temperature control and treatment evaluation. Additional thermometry is performed in prostate, rectum, urethra and bladder. Catheter positions are reconstructed by sonography. Prostate perfusion is estimated using the temperature transients. Temperature distribution is calculated using our hyperthermia treatment planning system and displayed in matched CT and MRI.

Results: Twelve patients have been treated. No toxicity above grade 2 has been recorded. An explicit learning curve has been experienced regarding implantation technique, position verification, catheter reconstruction, system power efficiency and temperature simulation. Goal temperatures in the prostate were reached. It proved to be possible to determine the full 3D-temperature distribution in the prostate. The obtained temperature distributions were validated by additional thermometry.

Conclusions: Combining external beam radiotherapy with MECS interstitial hyperthermia for locally advanced prostate carcinoma is feasible.