

## FIRST CLINICAL EXPERIENCE WITH THE AMC-8 LOCOREGIONAL HYPERTHERMIA SYSTEM WITH 3-D POWER CONTROL

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**Introduction:** The thermal dose achieved in clinical hyperthermia is often suboptimal due to the incidence of treatment limiting hot spots in normal tissue. The AMC-8 loco regional hyperthermia system was designed to cope with this problem by 3D power steering, using two rings of four waveguides (24x30cm) operating at 70 MHz with independent power and phase steering. This system replaces our AMC-4 system with a single ring of four waveguides (24x30cm).

**Purpose:** Performance and clinical feasibility of the AMC-8 system is tested in the first patients treated, after extensive measurements in phantoms and computer simulations.

**Methods:** Patients with pelvic malignancies are treated with 5 hyperthermia sessions. The AMC-8 system is clinically introduced in two steps, with 5 patients in each step. Step (1) compares both systems without 3-D steering. Each patient is treated 3 times using the AMC-4 and twice using the AMC-8 system, using one ring of 4 antennas. This step serves to compare the effective power output of both systems and tests system behavior. Step (2) compares 2-D with 3-D steering of the AMC-8 system. Each patient is treated 3 times using 4 antennas and twice using 8 antennas of the AMC-8 system.

During each session the steady state temperature expressed as  $T_{90}$ ,  $T_{50}$ ,  $T_{10}$ , power and SAR (using a  $\Delta T$  pulse) are scored. Toxicity is determined by scoring the incidence of treatment limiting hot spots.

**Results:** Step (1) is complete, five patients have been treated. No significant difference in power (608 and 617 W, respectively) or tumour temperature was found. The tumour temperatures for the AMC-4 and AMC-8 system (4 antennas), expressed as  $T_{90}$ ,  $T_{50}$ ,  $T_{10}$ , were 40.0°C, 41.2°C, 42.4°C and 40.1°C, 41.5°C, 42.6°C, respectively. Toxicity is acceptable for the AMC-8 and conforms toxicity found for the AMC-4.

Step (2) is not complete yet. The first patients have been treated and the 3D steering works well. Results on tumour temperature and toxicity are analysed when the full number of five patients have been treated.



**Conclusion:** First clinical experience with the AMC-8 system shows its clinical feasibility, there is no increase in toxicity. After completion of the acceptance test for eight antennas all pelvic tumours will be treated with the AMC-8 system.