Frequency dependent focusing with UWB hyperthermia applicator for H&N cancer treatment

Pc-46 Frequency dependent focusing with UWB hyperthermia applicator for H&N cancer treatment

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Background: In recent years, much effort has been devoted to improve heat delivery into deep seated tumors. A serious challenge in hyperthermia treatment is reduction of undesired energy distribution in healthy tissues. In this contribution we present a new UWB hyperthermia applicator for tumor-volume specific heat delivery in H&N region.
Methods: The steering ability of the proposed applicator has been assessed both numerically and experimentally in a muscle phantom as well as in an anthropomorphic phantom of the H&N region. For a qualitative evaluation, the power absorption distribution in the treated region has been carried out. The areas enclosed by the 25 % and 75% iso-SAR contours have been calculated in order to compare results quantitatively in terms of the change in focusing size, i.e. the region of high SAR values. The experimental results are evaluated in terms of temperature distributions obtained in phantoms.
Results: The simulation results show that iso-SAR areas of focusing decreased at higher frequencies. Quantitative analysis revealed improved performance indicators for focusing in small tumors by use of higher frequencies. The experimental results for the real system are consistent with the numerically data obtained.
Conclusion: The obtained results confirm that the appropriate choice of frequency improves heat delivery into tumor. Further improvements are possible by means of alternating between more scenarios with different frequencies during the treatment.

Pc-47 Double 434MHz hyperthermia unit designed for single and multiple large superficial and semi-deep tumor lesions

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Background: Modern radiotherapy(RT) approach for cancer treatment is driving a profound evolution in the available RT technology like Tomotherapy(TT) as well as in adjuvant Hyperthermia(HT) technology. An existing HT system has been redesigned for achieving a quality treatment for patients with multi-lesion superficial cancer eligible for a combined RT+HT.
Methods: Specific analysis of RT+HT eligible tumor size, localization together with simulation of HT treatments volume according to RT-TT schedules has been performed. An existing standard CE marked Hyperthermia System (ALBA HT System ON 4000-RESTEK-ITA) for single lesion treatment has been adapted to match the quality clinical standard and safety requirements for simultaneous HT treatments of double lesions.
Results: Digital ALBA Double Units remote controlled has developed with double 434Mhz amplifiers (200W), double micro-strips conformed temperature controlled antennas; synchronized EMC artifact free multi-channels(196) TC thermometer; Color Doppler GPS integrated ultrasound scanner for 50%SAR/tumor collimation and invasive tumor temperature registration; double remote consoles for real time treatment control; treatment/ patient data storage for HT post-processing according to ESHO protocols.
Conclusion: ALBA Double systems tested at the IRCC-Candiolo and AMC-Amsterdam Cancer Institutes perform simultaneous HT treatments on double tumor localizations complying both the HT international QA standards and modern RT and TT demands for individualized treatments.