Abstracts

SAR Patterns from an Interstitial Microwave Antenna-Array Hyperthermia System

T.Z. Wong, J.W. Strohbehn, K.M. Jones, J.A. Mechling and B.S. Trembly. "SAR Patterns from an Interstitial Microwave Antenna-Array Hyperthermia System." 1986 Transactions on Microwave Theory and Techniques 34.5 (May 1986 [T-MTT] (Special Issue on Phased Arrays for Hyperthermia Treatment of Cancer)): 560-567.

In recent years, a number of groups have been investigating the use of interstitial microwave antenna-array hyperthermia (IMAAH) systems for the treatment of superficial and deep-seated tumors. A critical parameter in any hyperthermia system is the SAR (specific absorption rate) pattern, which gives information about the energy absorption in the tumor and surrounding tissue. In this paper, we compare the theoretical and measured values of the SAR distribution for an array of four 915-MHz antennas implanted on the corners of a 2-cm square array. The overall length of the antennas was assumed to be 7 cm theoretically and was either 6 or 7 cm for the measurements. In general, there was good agreement between the theoretical predictions and the experimental results. In particular, both theory and experiment demonstrated that the maximum SAR occurred in the junction plane of the antenna array and at the center of the square array. Similarly, both showed that the Iongitudinal extent of the heating pattern is about 5 cm for a single antenna, but closer to 3 cm for an array where the Iongitudinal extent is defined by the length in the longitudinal direction where the SAR is greater than 50 percent of the maximum. The experiments showed that the SAR patterns were quite reproducible, and that the use of double stub tuners to minimize the reflected power for each antenna resulted in poorer SAR patterns due to phase variations created by the tuners. However, the use of an attenuator with each antenna to equalize the maximum SAR from each antenna did improve the SAR distributions slightly.

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