Abstracts

Performance Comparison of Available Interstitial Antennas for Microwave Hyperthermia

A.M. Tumeh and M.F. Iskander. "Performance Comparison of Available Interstitial Antennas for Microwave Hyperthermia." 1989 Transactions on Microwave Theory and Techniques 37.7 (Jul. 1989 [T-MTT]): 1126-1133.

The use of interstitial antennas for microwave hyperthermia has gained popularity because of the increased utilization of invasive treatment techniques using radioactive seeds. This method of directly applying therapeutic heating has the advantage of causing minimal damage to the surrounding healthy tissue and it helps achieve heating of deep-seated tumors. Several designs of interstitial antennas are commercially available and there is a need to evaluate and compare their performance. In a recent paper, an experimental comparison was made between three different antennas: the Dartmouth, the BSD Medical, and the Cheung. Many of the commercially available antenna designs are multisections, while available analytical techniques are only valid for uniformly insulated antennas. We have developed a numerical model which calculates the current distribution and radiation characteristics of multisection antennas having varying diameters of the center conductor and/or the types and thicknesses of the insulation. In this paper we briefly describe the model and compare the numerical results with the experimented data published by Ryan and Strohbehn. Excellent correlation between the experimental and calculated patterns was obtained. The numerical model was then used to examine some interesting changes in the commercial designs, such as the effect of the tip termination of the antenna and the diameters of the conducting sections (collars) on the heating patterns of the BSD Medical antenna. Important observations regarding the role of each section, in multisection antenna designs, in guiding along the antenna versus coupling to the ambient were also investigated and verified.

❑ Return to main document.