Abstracts

Effects of frequency, permittivity, and voxel size on predicted specific absorption rate values in biological tissue during electromagnetic-field exposure

P.A. Mason, W.D. Hurt, T.J. Walters, J.A. D'Andrea, P. Gajsek, K.L. Ryan, D.A. Nelson, K.I. Smith and J.M. Ziriax. "Effects of frequency, permittivity, and voxel size on predicted specific absorption rate values in biological tissue during electromagnetic-field exposure." 2000 Transactions on Microwave Theory and Techniques 48.11 (Nov. 2000, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 2050-2058.

Current electromagnetic-field (EMF) exposure limits have been based, in part, on the amount of energy absorbed by the whole body. However, it is known that energy is absorbed nonuniformly during EMF exposure. The development and widespread use of sophisticated three-dimensional anatomical models to calculate specific-absorption-rate (SAR) values in biological material has resulted in the need to understand how model parameters affect predicted SAR values. This paper demonstrate the effects of manipulating frequency, permittivity values, and voxel size on SAR values calculated by a finite-difference time-domain program in digital homogenous sphere models and heterogeneous models of rat and man. The predicted SAR values are compared to empirical data from infrared thermography and implanted temperature probes.

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