Abstracts

Combined electromagnetic and heat-conduction analysis of rapid rewarming of cryopreserved tissues

Cai-Cheng Lu, Huai-Zhi Li and Dayong Gao. "Combined electromagnetic and heat-conduction analysis of rapid rewarming of cryopreserved tissues." 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)): 2185-2190.

A combined solution of an electromagnetic (EM)-wave equation and head transfer equation is presented to analyze the microwave rewarming process of cryopreserved tissues. The solution process starts with an initial temperature of the tissue. The EM-field distribution inside the tissue is determined first by solving hybrid surface-volume integral equations. This solution provides a thermal source term for the heat-transfer equation. A finite-difference scheme is then applied to solve the heat-transfer equation, which determines the temperature distribution inside the tissue for the next time step. Since the tissue's electrical characteristics (/spl epsiv/ and /spl sigma/) are functions of temperature, their values are then updated based on the new temperature distribution. The iteration continues until a termination condition is satisfied. This combined iterative solution of wave equation and heat-transfer equation allows one to model the complex rewarming process. Numerical results are presented to demonstrate the application of the combined analysis approach.

❑ Return to main document.