Abstracts

915-MHz Phased-Array System for Treating Tumors in Cylindrical Structures

A.W. Guy, C.-K. Chou and K.H. Luk. "915-MHz Phased-Array System for Treating Tumors in Cylindrical Structures." 1986 Transactions on Microwave Theory and Techniques 34.5 (May 1986 [T-MTT] (Special Issue on Phased Arrays for Hyperthermia Treatment of Cancer)): 502-507.

A phased-array 915-MHz microwave system consisting of four 13x13 cm square applicators was constructed and tested for its design in heating both deep and superficial tumors in cylindrical structures such as the upper and lower extremities or neck. Since each applicator produced SAR patterns in cylindrical phantoms in a plane through the array similar to those produced by a plane wave, a theoretical analysis of the SAR patterns due to the superposition of four plane waves incident on a cylindrical tissue was done. By altering the orientation of the E-field (either parallel or perpendicular to the axis of the cylinder), as well as the phase and amplitude of the incident waves, various distinct SAR patterns were predicted. Thermograms used to experimentally verify the SAR patterns produced by the four applicators showed similar results with those predicted by the plane-wave analysis. A patient with recurrent melanomas on a lower leg was subjected to a clinical trial of hyperthermia in which high tissue temperatures were produced by utilizing two sets of the phased-array system in series. A therapeutic temperature of 43°C in tumor tissues was confirmed by invasive thermometry with high-resistance thermistors.

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