Guest Editorial

ULTRASOUND has been used in diagnostic and therapeutic medicine for forty years. While diagnostic ultrasound is widely employed clinically, clinical therapeutic applications have largely been limited to physical therapy, where the absorption properties of ultrasound in tissues are used to induce heating.

Interest in the use of hyperthermia (elevated temperature) for the treatment of cancer fostered the development of radio-frequency, microwave, as well as, ultrasound systems designed to deliver heat to tumors located at a number of anatomic sites. Over the past several years, the North American Hyperthermia Group has held annual meetings dealing with all aspects of hyperthermia. Special sessions devoted to ultrasound hyperthermia have been held at recent meetings of the IEEE Sonics and Ultrasonics Group, of the American Institute of Ultrasound in Medicine, and of the Acoustical Society of America.

Most recent investigations concerning the application of hyperthermia for cancer therapy have been directed toward the design and evaluation of "regional" or "local," rather than "whole body," hyperthermia delivery systems. The propagation properties of ultrasound appear to be well suited for employment in hyperthermia treatment. Its wavelength at frequencies which exhibit acceptable attenuation–limited penetration, for example, make it an extremely attractive modality for the local treatment of deep-seated tumors.

Several laboratories have been engaged in important research directed toward the development, and clinical application, of ultrasound hyperthermia. It is the purpose of this issue to foster an increased awareness of such research among those who might contribute to its technical development in a significant way.

The papers in this issue include two invited and seven contributed papers. The invited papers discuss the biological and clinical aspects of ultrasound hyperthermia, the effectiveness of such therapy when combined with other cancer therapy modalities, and examine the effect of blood flow on therapeutic heat treatment. The third paper describes a system for ultrasound dosimetry at hyperthermia therapy levels, followed by three papers dealing with the therapeutic effects of high-intensity ultrasound and one reporting the temperature rise in tissue as a result of ultrasound exposure. The role of blood flow in hyperthermia in a general sense, and the design criteria for a phased array ultrasound hyperthermia applicator, respectively, are the topics of the final two papers of this issue.

We wish to express our appreciation for the efforts and support of the authors who responded to the "Call for Papers" for this special issue. We also wish to acknowledge the contributions and efforts of Dr. W. D. O'Brien, Jr., who suggested the assembly of a special issue on this topic, and of S. Wanuga, for his assistance and advice during the editorial process. The thoughtful suggestions and contributions of the many paper reviewers are also greatly appreciated. Finally, we offer special thanks to Ms. Tina Lipscomb and Ms. Wanda Elliott for their help in processing the correspondence related to the Special Issue.

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