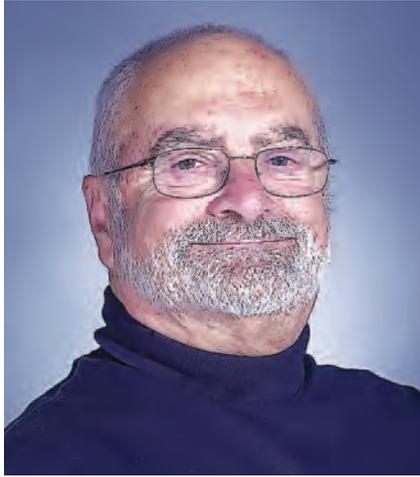


FROM THE EDITOR

Dick Stern

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This is a very special issue of *Acoustics Today*. It is the first issue totally devoted to Medical Ultrasound. Vera Khokhlova, the guest editor, did a fantastic job of organizing the issue and encouraging the authors to keep their articles simple, interesting, and very readable. They have done so and there is much to read and to learn. If you do research in the field or are just interested in finding out what the field is about, this is your issue. Enjoy.

Dick Stern

FROM THE GUEST EDITOR

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ULTRASOUND PROMISES REVOLUTIONARY ADVANCES IN MEDICINE

The latest decade has been an exciting time in developing medical ultrasound both for diagnostic imaging and for therapeutic applications. In diagnostics, besides advances in conventional imaging modalities, a promising development is to combine the relative advantages of different physical technologies to get additional information about the tissues of interest. One example of such synergistic approaches that is presented in the current issue is “photoacoustic imaging.” This hybrid imaging method combines ultrasound and optical waves, taking advantage of the high optical contrast and the



deep penetration of ultrasound in tissue. In multimodal systems, in addition to anatomic information of the conventional ultrasound image, embedded photoacoustic images give physiological and biochemical information of tissues, thus improving medical diagnostics.

In therapeutic applications, noninvasive ultrasound surgery or HIFU (High Intensity Focused Ultrasound) technology is emerging from laboratory experiments and bioengineering studies toward exciting (and revolutionary) clinical applications. HIFU treatments vary from transcutaneous ablation of benign

and malignant tumors, to acoustic hemostasis, sonothrombolysis (non-invasive treatment of strokes), and ultrasound-assisted drug delivery. Recent advances that are illustrated here are trans-skull brain surgery and ultrasound-induced nerve modulation. Although most HIFU treatments utilize the thermal effects of ultrasound, i.e., thermal necrosis of the target tissue volumes heated by ultrasound, newer technologies exploit different physical phenomena, such as the direct mechanical bioeffects of

ultrasound. One of these recent new methods overviewed here is “histotripsy”—mechanical ablation of tissue using shock waves and bubbles.

Current medical ultrasound technologies are based on new interesting physical phenomena, biophysics, engineering solutions, and exciting interdisciplinary studies. We hope that some of the examples of recent developments presented in this issue will be of general interest to the acoustics community and to a wider scientific audience.

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