

Exploring The Ultrasound Of The Future – Breaking The Sound Barrier To Overcome Barriers In Current Diagnosis And Treatment Of Disease

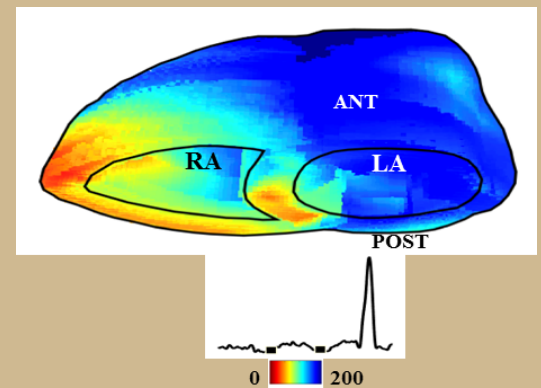
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ABSTRACT:

Ultrasound has been in the clinic as an imaging and therapeutic modality for over four decades. In imaging, elasticity imaging has been capable of expanding the role of ultrasound imaging in the clinic by providing quantitative information on the underlying mechanical properties. Emphases of this presentation will be given on cardiovascular elasticity imaging techniques such as Myocardial Elastography, Electromechanical Wave Imaging (Fig 1A) and Pulse Wave Imaging for the characterization of mechanical and electrical cardiac properties and vascular mechanical properties, respectively, based on the intrinsic pulsational function of the heart and blood vessels. Elasticity imaging on preclinical and clinical tumor characterization in the breast and pancreas using the radiation-force technique of Harmonic Motion Imaging will also be presented. In therapeutics, Focused Ultrasound (FUS) has been shown efficacious for applications spanning from nerve stimulation to tumor ablation over the past six decades but clinical translation has only been feasible during the last decade harnessing from MRI thermometry. The lecture will focus on ultrasound-based monitoring by depicting the associated stiffness change as well as on the more recent advances of opening of the blood-brain barrier (BBB) for brain drug delivery towards the treatment of Alzheimer's, Parkinson's (Fig. 1B) and brain cancers well as central and peripheral nervous system modulation.

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