Performance improvement of HIFU system for prostate cancer treatment

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Abstract

High-intensity focused ultrasound (HIFU) has been investigated as a noninvasive surgical method for homeostasis and the treatment of tumors located in various tissues, including the brain, prostate, liver, kidney, and breast.

The performance of the current High Intensity Focused Ultrasound (HIFU) system used to treat prostate can be improved by monitoring temperature map of the heated area to enhance treatment capabilities, reduce treatment planning and execution time, increase probe reliability, and reduce the reliance on the transducer mechanical positioning system.

The performance of arrays with spherical and cylindrical geometry can be evaluated by using computer simulations of the pressure fields produced at various extremes of steering. To avoid heating healthy tissue more than it is permitted, non invasive methods of temperature monitoring have been investigated. An efficient algorithm for using envelop-detected signal (digital image) in ultrasound thermometry during clinical hyperthermia can be implemented. This 45‐minute talk will essentially focus on these methods, and how they improve the performance of a HIFU system for cancer treatment.

Biography of Speaker

Mohammadjavad Abolhassani is an Associate Professor of Biomedical Engineering at Tehran University of Medical Sciences, and Head of Biomedical systems group of Research Centre for Science and Technology in Medicine. He has published more than 70 papers in peer-reviewed journals and conferences, 2 books and many hold many awards and patents. His research interests include Medical Instrumentation, Medical Ultrasound Instrumentation, Ultrasound Image Processing, Otoacoustic Emission Systems and Biological Signal Processing. He has been involved in industrial projects for commercialization of many Biomedical Instruments. At the moment he is a visiting professor at Ryerson University.