



Dual-mode High-Intensity Focused Ultrasound (20100235)

Dual-mode High-intensity Focused Ultrasound Transducer for Real-time Delivery of Therapy

HIFU used in Ablation of Diseased Tissues

High-Intensity Focused Ultrasound (HIFU) is a technology that produces high frequency, focused ultrasound beams to destroy diseased tissues. Ablation of tissues occurs when the ultrasound beams locally increase the temperature of diseased tissue in order to destroy the tissue. Presently, it has approval from the FDA as a treatment for uterine fibroids, though it's in clinical trials for a number of other indications such as rectal pelvic cancer, parathyroid adenoma, prostate cancer, and breast fibroidadenoma. HIFU is used as an option for prostate cancer reoccurrence after radiation therapy failure.

Using MRI has Limited Temporal Resolution

Typically, magnetic resonance imaging (MRI) provides image guidance for HIFU by identifying tumors fibroids or other diseased tissue. MRI is limited in temporal resolution and is not able to provide truly, real-time closed-loop feedback on the progress of the HIFU ablation/lesion development.

More recent efforts have focused on dual-mode ultrasound-guided HIFU therapy to track tissue lesion development with greater temporal resolution. However, these dual-mode ultrasound transducer systems still have delays measured in seconds and are relatively an open-loop, single shot HIFU system thus providing no intensity modulation.

Improved Temporal Resolution, Real-Time Control and Intensity Modulation

A recently developed dual-mode ultrasound system offers time resolution in milliseconds and provides closed-loop, real-time control based on continuous monitoring of the tissue response to the HIFU beam. This method provides greater control of HIFU delivery, in both directing energy to the target and limiting collateral damage, which is expected to improve clinical outcome and reduce treatment time. Temporal resolution is also improved over other HIFU systems.

FEATURES AND BENEFITS OF DUAL MODE ULTRASOUND-GUIDED HIFU:

- Real-time, closed-loop control of the HIFU exposure in both space and time
- Allows continuous adjustment and monitoring of the tissue response to HIFU in real-time (ms resolution)
- Improved temporal resolution over MRI-guided HIFU providing closed-loop control
- Offers real-time intensity modulation to destroy diseased tissue while limiting collateral damage

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