Treating Tumors with High Intensity Focused Ultrasound

Technology #20160370
Tumor Ablation Using MRI

An injectable liquid embolic agent mixed with piezoelectric crystals enables a novel method of tumor ablation using ultrasound or magnetic resonance imaging (MRI). The liquid embolic agent is delivered to a tumor in a minimally invasive manner, and the piezoelectric crystals produce an increase in temperature at the treatment site, potentially resulting in tumor ablation with lower ultrasound energies and avoiding the usual pitfalls of HIFU.

Piezoelectric Agent Localized to Tumor

Previous attempts at using piezoelectric substances for ultrasound ablation have relied on intravenous injection of these agents, which are hoped to localize in the tumor bed by active uptake. These techniques suffer from poor tumor concentration of the agents and high background uptake. The technology achieves high concentration of piezoelectric crystals in the tumor bed by directly delivering a combination of piezoelectric material and embolic agent to the tumor either via direct needle injection or via intra-arterial injection into the tumor bed.

BENEFITS AND FEATURES:

- Novel method of tumor ablation using ultrasound or MRI
- Liquid embolic agent mixed with piezoelectric crystals
- Performs ablation with lower ultrasound energies
- Extracorporeal ultrasound transducer delivers high intensity focused ultrasound or RF pulses to treatment site

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Tumor Ablation Flowchart

- Piezoelectric crystals produce heat from sound generation
- Embolic agent helps with high concentration local deposition of piezoelectric agent and also reduces tumor blood supply reducing local heat sinks.
- High precision; minimizes damage to surrounding tissue
- Potentially requires no MR guidance due to visibility of embolized lesion to ultrasound and potential ultrasound thermometry.
- Potentially can help plan HIFU beam geometry by enabling time-reversal modeling.

APPLICATIONS:

- Tumor embolization and ablation
- Medical devices
- Intracranial tumors
- Malignant tumors
- Benign tumors

Phase of Development - In vitro assessment

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<td>The University relies on industry partners to scale up technologies to large enough production capacity for commercial purposes. The license is available for this technology and would be for the sale, manufacture or use of products claimed by the issued patents. Please contact Kevin Anderson to share your business needs and technical interest in this technology and if you are interested in licensing the technology for further research and development.</td>
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