

**MRI-guided Focused
Ultrasound robotic
system for brain tumors.**



BRAINSONIC

ENTERPRISES/0223/SUB-CALL1/0057

NEWSLETTER

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**Assessment of System Performance and Protocol
in a Glioblastoma (GBM) Mouse Model**



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RECOVERY AND RESILIENCE PLAN



FOCUSED ULTRASOUND IN GLIOBLASTOMA MICE: STUDY OVERVIEW

This study explored the use of focused ultrasound (FUS) for targeted ablation of glioblastoma (GBM) tumors in a mouse model, using the BRAINSONIC robotic system.

A mouse model of GBM was established using GL261 tumor cells to enable FUS targeting of well-defined intracranial tumors. Tumor-bearing mice received a single FUS exposure directed at the tumor site, while a group of healthy mice served as control to provide a procedural reference. All sonications were performed using predefined intensity and duration parameters that were applied consistently across all subjects.



Step 1: GL261 Cell Culture Maintenance



Step 2: Single-Cell Suspension Preparation



Step 3: Stereotactic Brain Injection in C57BL/6 Mouse



Step 4: Mice Housed for two Weeks Before FUS

Tumor development in C57BL/6 mice

The 3 degrees-of-freedom (DOF) robotic system, incorporating a single-element spherically focused ultrasonic transducer operating at 2.75 MHz, was employed. The accompanying treatment-planning, control, and monitoring software platform enabled automated triggering and coordinated control of robotic motion and FUS exposure.

The study focused on evaluating the acute tissue response to FUS under controlled conditions. Histological analysis using hematoxylin and eosin (H&E) staining was performed shortly after treatment to characterize immediate structural changes and assess short-term tissue integrity.



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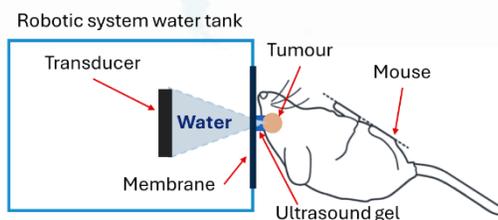
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KEY EXPERIMENTAL RESULTS

Histological Outcomes

Acute histological evaluation revealed clear tissue alterations within the sonicated GBM regions. Treated tumor areas exhibited coagulative necrosis, characterized by eosinophilic staining, loss of nuclear detail, marked neuronal dropout, and localized tissue rarefaction consistent with ablative effects.

In contrast, unsonicated brain regions in control samples and in tissue surrounding the FUS-treated GBM region showed preserved architecture, indicating that areas outside the focal zone remained unaffected under the tested conditions.



Schematic of FUS delivery to mouse brain tumor

Key Findings

- ✚ Localized coagulative necrosis observed in sonicated tumor tissue.
- ✚ Loss of nuclear structure and reduced cellular integrity in ablated regions.
- ✚ Unsonicated brain regions preserved normal cytoarchitecture.
- ✚ No acute complications noted during or immediately after the procedure.

Outlook

These early results support the feasibility of robotic FUS delivery for targeted tumor ablation in a small-animal GBM model. Future studies may incorporate longer-term follow-up to evaluate tumor growth dynamics and overall treatment response. Overall, the findings validate the BRAINSONIC platform for experimental neuro-oncology research and motivate further in-vivo experimentation.