MRI-guided HFIRE Ablation of Canine Intracranial Tumors

Purpose

To further evaluate the safety and feasibility of MRI-guided High-Frequency Irreversible Electroporation (HFIRE) for the treatment of glioma brain tumors.

Background

HFIRE is a newer generation technology, similar to the NanoKnife system, which is used for the destruction of soft tissues (i.e. tumors or cancers) via irreversible electroporation (IRE). We have previously demonstrated the safety of IRE for the treatment of canine brain tumors and have safely performed HFIRE on soft-tissue tumors, including brian tumors, in client-owned dogs, cats, and horses. By placing thin electrodes within tissue, IRE uses electrical pulses to destroy tissues by disrupting cellular membranes. The IRE method is less invasive and disruptive than traditional methods of surgical tumor resection. HFIRE offers additional advantages over traditional IRE in that the high-frequency pulses do not result in electrically induced muscular contractions, eliminating the need for more anesthesic agents, and offering the potential to selectively kill cancer cells and spare normal, healthy cells based on the physical characteristics of the cells. The newest generation of HFIRE technology allows the neurosurgeon to perform the HFIRE treatment while the patient is in the magnetic resonance imaging (MRI) scanner, which we believe will improve the safety and efficacy of the procedure.

Eligibility

- MRI evidence of a solitary mass lesion consistent with glioma in the cerebrum. Dogs with tumors previously treated with surgery are also eligible if there is MRI documented evidence of tumor progression.
- Lesion diameter of at least 10 mm
- Clinical signs of mild to moderate neurologic dysfunction referable to the brain.
- No clinical or other diagnostic evidence of other significant systemic disease.

Exclusion Criteria

- Dogs that are pregnant
- Uncontrolled seizures or other severe neurological signs
- Bone marrow suppression, or significant kidney or liver dysfunction evident on blood tests
- Concurrent infections or malignancy
- Prior treatment of the tumor with radiation therapy of any kind

Study Design

Once enrolled, dog will be admitted to the Veterinary Teaching Hospital in Blacksburg, VA, usually on a Monday. The day following admission, enrolled dogs will undergo a biopsy to confirm tumor type and grade, along with imaging to plan the HFIRE procedure. On the day of the procedure, the HFIRE electrodes will be inserted into the brain tumor with MRI guidance and HFIRE pulses delivered using a treatment plan customized for each patient. Dogs will be cared for post-operatively using standard-of-care procedures for brain tumor patients, and monitored in the ICU for adverse events until discharge from the hospital. Typically, dogs remain in the hospital for a total of 5-7 days.

Following discharge, dogs will return every 6-8 weeks for a recheck visit and a follow-up MRI for up to six months.

Compensation

The fees associated with the HFIRE treatment and the associated pre- and post-operative hospitalization costs will be covered by the study sponsor. Scheduled follow-up visits and brain MRI examinations every 6-8 weeks for up to six months after the surgery to evaluate the treatment will also be covered by the study. The owner is responsible for non-study related veterinary care and for the cost of ongoing medications.

Contact

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*If your query is urgent, please call the Small Animal Hospital (540) 231-4621 and ask for the **neurologist** on duty.*