

Alexandra Golby, MD

Young Clinician Award 2008

Investigator Profile

Education

- MD, Stanford University
- BA, Yale University

Clinical /Professional Appointment

- Associate Surgeon, Brigham & Women's Hospital
- Assistant Professor of Surgery, Harvard Medical School
- Director of Image Guided Neurosurgery, Brigham & Women's Hospital

Recent Honors and Awards

- Member, NIH Biomedical Imaging Technology Study Section
- Dandy Clinical Fellowship, Congress of Neurological Surgeons
- National Research Service Award, National Institutes of Health, 1 F32 NS 10925-0 1
- Henry Newman Award, San Francisco Neurological Society



Impact on Care

- There are 40,000 primary brain tumors diagnosed per year. Of these, perhaps 25% might benefit from this type of approach eventually.
- Increased ability to differentiate between tumor and brain matter and to identify areas of metabolically active tumor
- Improved accuracy and precision, allowing for preservation of healthy brain tissue
- Help to achieve more complete tumor resection which can extend time to progression, decrease tumor burden, and make other treatments more effective
- Reduced radiation exposure for the surgeon

Abstract

Surgery remains the single most effective treatment for patients with brain tumors. Gross total tumor resection increases time to progression and survival in both high- and low-grade tumors and may be curative for some tumor types. Delineation of resection margins is very difficult because tumors resemble brain, often infiltrate brain tissue, may be immediately adjacent to critical functional brain tissue, and deformation of brain structures occurring intra-operatively renders pre-operative images inaccurate. Main predictors for incomplete tumor resection are large tumor volume, histopathology, tumor involvement of eloquent cortex and large fiber tracts, (Talos et al. 2006). The majority of malignant gliomas recur within 2 cm of the enhancing edge of the original tumor (Hochberg et al. 1980).

The goal of this project is to develop a reliable and robust robot-driven positron-detection probe system to assist neurosurgeons in clearing margins of residual brain tumor tissue following bulk tumor resection. Tumor tissue takes up a higher concentration of an appropriate positron-emitting radiopharmaceutical (injected just prior to surgery), the positron-detection probe measures a higher count-rate from tumor tissue than from normal tissue. Computer guidance will continuously record the position of the probe and count-rate measurements and will also control the scan motion of the probe, while utilizing strict constraints on this motion provided by the surgeon, produce a map of the positron count-rate on a surgeon-prescribed surface within the surgical cavity and improve the accuracy and efficiency with which residual tumor tissue can be detected and removed.

Intra-operative neuronavigation display shows surgeon detailed cross sectional views and 3-D rendering of brain, lesion, and electrophysiologic data.

