

## Neurosurgical Advances at Penn: Awake Craniotomy for Resection of Oligodendroglioma

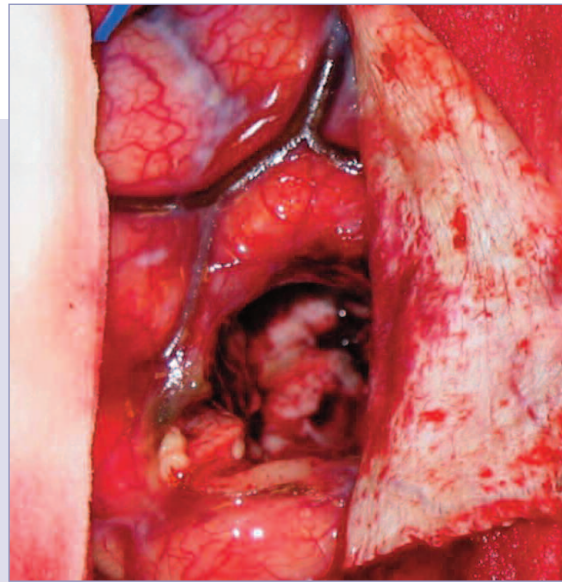
The spectrum of surgical options at Penn Medicine's Department of Neurosurgery includes awake craniotomy, which uses functional MR imaging intraoperatively to delineate the relationship between infiltrative glial tumors and speech and motor pathways in the brain. The techniques of awake craniotomy surgery permit Penn neurosurgeons to preserve functional tissue within the motor and speech cortex with greater reliability and better tumor resection than other forms of brain surgery.

During awake craniotomy surgery, the patient is sedated while electrical stimuli are induced on the brain surface by the operating neurosurgeon. The patient is then wakened and his or her conscious reaction to this stimulation is used to tailor a motor and/or speech map of the brain. This map permits surgeons to maximize tumor removal while preserving functional tissue during surgery with minimal neurologic risk to the patient.

The benefits of multidisciplinary care at Penn are especially evident in awake craniotomy surgery, which requires a seamless coordination between surgeon and anesthesiologist to achieve the interaction of surgeon and patient and the balance of states of waking and sedation. Other team members include a neuroradiologist, who provides functional MRI scans during the procedure, neurologists/neurophysiologists to assess functional speech and brain electrical recordings, and nurse practitioners and trained operating room nurses, who facilitate the use of surgical technologies required in these brain tumor cases.

### CASE STUDY

After experiencing several seizures, Mr. S, a 61-year-old male, underwent resection of an oligodendroglial brain tumor of the left temporal lobe in 1992, followed by standard radiation therapy. Following his surgery, he was highly functional with only rare seizures and returned to work as a practicing nurse anesthetist. In July 2008, however, he noted an increase in his seizure frequency and underwent a repeat MRI that showed increased infiltrative left temporal tumor with close proximity to the language cortex. He underwent a functional



Intraoperative photo of brain following tumor removal; margins of safe resection confirmed by awake speech testing.

MRI that allowed mapping of his speech center in a non-invasive manner. This MRI scan was performed at the same time as an image-guided MRI, allowing for precise intraoperative localization of the tumor with an accuracy of less than 1mm. The cumulative data indicated that Mr. S would be ideal for awake surgery with intraoperative speech mapping, and after counseling, he agreed to this approach. In the operating room, direct cortical stimulation was performed by the surgical team and the data were analyzed by anesthesiologists and neurophysiologists. The surgical team was able to maximize tumor resection while at the same time minimizing manipulation of critical language cortex. Post-operatively, Mr. S was without a speech deficit and the post-resection MRI scan indicated a near complete tumor removal in a highly infiltrative recurrent oligodendroglial brain tumor. The resected tumor tissue was then subjected to cytogenetic and molecular analysis to allow for a more rational treatment selection.

## Our Team of Faculty

The Department of Neurosurgery at Penn is recognized internationally for excellence in patient care, resident education and scientific research. The faculty includes highly experienced neurosurgeons, each of whom has a subspecialty focus in addition to neurosurgery. Our surgical neuro-oncology specialists include:

### Hospital of the University of Pennsylvania

**Kevin D. Judy, MD\***

Associate Professor of Neurosurgery

**Donald M. O'Rourke, MD\***

Associate Professor

**James M. Schuster, MD, PhD**

Assistant Professor of Neurosurgery

### Pennsylvania Hospital

**John Y. K. Lee, MD**

Assistant Professor of Neurosurgery

**Peter D. Le Roux, MD**

Associate Professor of Neurosurgery

*\*Performing Awake Craniotomy Surgery at the  
Hospital of the University of Pennsylvania*

## Access

Patient appointments are available at:

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Hospital of the University of Pennsylvania**

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Office: 215.662.3490

**Department of Neurosurgery  
Pennsylvania Hospital**

330 South 9th Street, 4th Floor

Philadelphia, PA 19107

Office: 215.829.7144

### Neurosurgery Research at Penn: The Human Brain Tumor Tissue Bank

Under the direction of Donald M. O'Rourke, MD, the Human Brain Tumor Tissue Bank at Penn is among the largest repositories of brain tumor tissue in the United States, and as such, represents an invaluable foundation for research into the genetic origins of gliomas and other human cancers.

Gliomas, the most common of the primary brain tumors, are the object of intense research efforts at Penn. Thus, the objectives of the Brain Tumor Tissue Bank include the development of drug-based treatments for gliomas and other human cancers. In addition, Penn researchers are refining methods of genetic testing for gliomas and oligodendrogliomas; new treatments for gliomas based on genetic alterations detected in these tumors; and an exploration of the relationship between an epidermal growth factor receptor mutation present in many primary glioblastomas and glioma cell growth, angiogenesis and survival.

One of only a few such dedicated brain tumor banks in the United States, the Brain Tumor Tissue Bank is operated by the research faculty of the Penn Department of Neurosurgery, who play a critical role in advancing clinical research in neurosurgery as investigators in the full gamut of research modalities.

TO REFER A PATIENT AND/OR CONSULT WITH A DOCTOR

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