

# Brain tumor diagnosis: combining specialized surgical techniques with sophisticated brain imaging and innovative research protocols

As Orange County's leading brain tumor program, Hoag Hospital offers a unique multi-modality diagnostic and treatment program for patients suffering from benign and malignant brain tumors.

Hoag's multidisciplinary team of brain tumor specialists are committed to providing the latest and most effective diagnostic imaging studies, surgical techniques, clinical research, and management strategies for each patient.

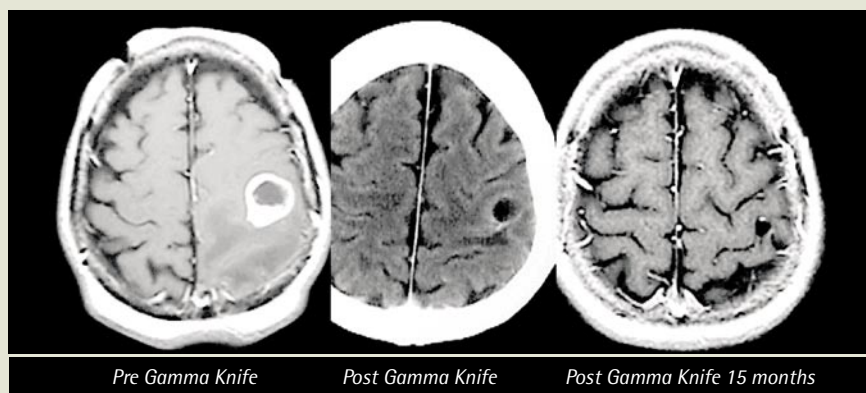
Experience and expertise is what sets Hoag's brain tumor program apart. Treating more than 300 brain tumors each year, Hoag neurosurgeons offer a significant level of experience. And while many hospitals offer either craniotomy or stereotactic radiosurgery, Hoag clinicians specialize in both surgical brain tumor management and Gamma Knife and are therefore uniquely equipped to approach each case with an unbiased opinion regarding treatment modality.

## Stereotactic radiosurgery

Hoag's Gamma Knife Center is the only one of its kind in Orange County and provides an effective treatment option with exceptional outcomes. The Gamma Knife administers a single fraction focused dose of radiation to stop and/or reduce the growth of abnormal tissue by destroying the DNA mapping

of cancer cells and rendering them unable to divide. With steep dose falloff, Hoag clinicians are able to prevent injury to surrounding healthy tissue, while delivering a powerful dose to the targeted tumor.

provides enhanced navigation using computer-generated 3D images of brain anatomy. This technology allows for smaller incisions and less tissue dissection through enhanced preoperative planning.



*MRI revealing solitary breast cancer metastasis prior to Gamma Knife treatment, immediately following Gamma Knife delivery, and 15-months post Gamma Knife treatment.*

“Approximately 60% of the brain tumors we treat at Hoag are Gamma Knife candidates,” comments Christopher Duma, MD, medical director of Hoag's Gamma Knife Center and vice-chair of the department of neurosurgery. “We utilize the Gamma Knife most frequently in treating brain metastases, where we'll often incorporate the Gamma Knife as an adjunct to surgery, radiation therapy or chemotherapy.”

## Specialized surgical techniques

When surgical intervention is necessary, Hoag neurosurgeons employ image-guidance, which

Hoag surgeons also specialize in awake craniotomy. During this procedure, functional mapping is performed using electrodes to stimulate the brain tissues and nerves around the tumor in order to identify critical sensory areas to be avoided during surgery. This allows the surgeon to reduce operative risk, while maximizing the volume of tumor that can be removed.

Additionally, Hoag surgeons are among few in the nation specializing in endoscopic pituitary and intraventricular tumor resection. An endoscope is guided through the nose to access the tumor site, sparing the patient from an invasive open

surgical procedure. With improved visualization through the endoscope, surgeons are able to improve their resection abilities.

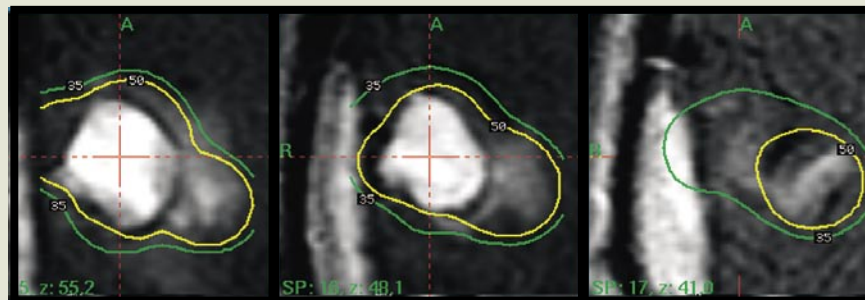
## Sophisticated brain imaging

Hoag's sophisticated magnetic resonance brain imaging techniques identify the exact location of a tumor within the brain, providing critical information for Hoag neurosurgeons during preoperative treatment planning.

Hoag's 3 Tesla MRI, the most advanced MR technology available, gives neurosurgeons the ability to

Utilizing functional MRI (fMRI), Hoag neurosurgeons can pinpoint abnormalities and identify important areas of the brain that control movement, speech and senses—areas to be avoided during surgery. Neurosurgeons also use this information to quantify and limit the radiation dose delivered to healthy cells during Gamma Knife treatment.

Multivoxel MR Spectroscopy imaging is also used extensively for mapping the brain's anatomy to distinguish between healthy tissue and abnormal or damaged areas, to view blood vessels in tumors, and



*Leading Edge: Multivoxel MR Spectroscopy is utilized to define positive areas outside of the gadolinium T1-weighted enhancing zones. Targeting these zones with Gamma Knife is proving to be a successful method of blocking the leading edge of malignant gliomas.*

study brain function, both metabolic and physiologic, including the ability to test brain stimulation with various challenges when planning surgery. With the ability to image metabolic function in the brain, Hoag clinicians can also study how brain tumors are responding to treatment.

to locate the leading edge or growing areas of a tumor.

## Research protocols

Dr. Duma has combined Multivoxel MR Spectroscopy with Gamma Knife radiosurgery to develop a unique treatment protocol designed to treat glioblastoma multiforme (GBM), one of the most common and devastating brain tumors.

In addition to local tumor recurrence, GBMs frequently spread along the white matter pathways in the brain. Dr. Duma's protocol targets the leading edge of these tumors, thereby effectively halting their spread.

“By delivering the leading edge treatment as an adjunct with our immunotherapy protocol, we've been able to significantly improve quality of life for these patients; in some cases, doubling their life expectancy,” Dr. Duma asserts.

Hoag's immunotherapy protocol for glioblastoma multiforme involves the use of lymphokine activated killer (LAK) cells. Hoag immunologists use lymphocytes, which circulate in the blood stream and have inherent anti-cancer activity, and stimulate them with interleukin-2. Hoag neurosurgeons then inject the patient's own immune activated LAK cells into the brain tumor at the time of surgery, aiming to teach the body to kill cancer on its own.

Through this innovative clinical and laboratory research, Hoag scientists continue to make progress toward developing and refining clinical strategies for treating brain tumors.

## To Refer a Patient

*To refer a patient or to contact a brain tumor specialist at Hoag, please call 949/764-6232.*