Gamma Knife® radiosurgery is one of the most advanced and minimally invasive options for brain tumor treatment. For many patients, this computer-guided therapy can deliver targeted radiation to reduce tumors and lesions deep within the brain with pinpoint accuracy that can’t be matched by traditional surgery. What's more, this outpatient procedure is nearly painless and requires no incisions.

This treatment is a well-established and widely recognized option in use around the world, and is approved for use by the U.S. Food and Drug Administration. Worldwide, more than 30,000 patients undergo Gamma Knife treatment each year. While it is most commonly used to treat brain metastases, it may also be used as a therapy for primary and benign brain tumors, trigeminal neuralgia, arteriovenous malformations and certain movement disorders.

Since 1997, Cleveland Clinic's Gamma Knife Center has treated more than 4,000 patients with Gamma Knife radiosurgery. Part of Cleveland Clinic’s Neurological Institute, the Gamma Knife Center is a leading-edge radiosurgery treatment center that combines innovative technology with medical expertise to offer patients diagnosed with a brain disorder a less invasive alternative to conventional brain surgery.

Cleveland Clinic's neurology, neurosurgery and cancer programs were named among the country's best in U.S. News & World Report's 2014 “Best Hospitals” survey – the top ranking for these programs in Ohio.

USING THIS GUIDE

Please refer to this guide as you examine your treatment options. Remember, it is your right as a patient to ask questions and seek a second opinion.
How does Gamma Knife treatment work?

For Gamma Knife radiosurgery, a single one- to two-hour treatment is typically required, in which 192 beams of gamma rays are focused at multiple points throughout the target with the aim of matching the delivered radiation to the shape of the tumor. Thus, the gamma radiation is concentrated in the tumor, and falloff in adjacent tissue is very steep, minimizing radiation to tissue lying in the entry or exit pathways. Because of this precise focusing ability, aggressive, high-dose gamma radiation can be delivered to stabilize, shrink, or destroy some lesions – even those deep in the cerebral hemispheres or brain stem.

What are the advantages of Gamma Knife treatment?

For appropriate patients, the Gamma Knife offers many advantages over conventional neurosurgery, including:

- Minimally invasive procedure with no incision
- An option for some tumors located deep in the brain that cannot be reached safely by traditional brain surgery
- An outpatient procedure that rarely requires an overnight hospital stay
- Generally safe, effective treatment with a low complication rate
- Lower risk than conventional brain surgery
- Little or no post-treatment discomfort or pain
- Rapid return to normal activities, without the need for physical therapy or other rehabilitation
- Covered by most insurance companies and Medicare
- A new Extend™ headframe may be used in certain cases, allowing treatment to be spread out over several days (in which case, the course of treatment will differ from that described in this brochure)
What can I expect before my treatment session?

A family member or friend will need to accompany you on the day of your Gamma Knife procedure and drive you home after the treatment.

You should not eat or drink after midnight the evening before your procedure. It is recommended that you wash your scalp/hair the night before your Gamma Knife radiosurgery and wear your hair loose. Do not use any clips, pins, bands, hair spray or styling products. Also avoid using cosmetics.

The day of the procedure, wear slip-on shoes; comfortable pants, slacks or shorts; and a button-up or zip-front shirt with loose-fitting or short sleeves. Shirts that fit over your head are not recommended because you will have a frame placed on your head, which will make it difficult for you to change clothing during your procedure.

What can I expect during the treatment?

When you arrive for your Gamma Knife treatment, an IV will be inserted to administer medication that will help you relax during the procedure. You will change into a hospital gown, receive a local anesthetic and be fitted with a head frame weighing about two pounds, which will remain on throughout the procedure. You will feel some pressure but little pain during this fitting process. The purpose of the head frame is to allow the target in the brain to be precisely pinpointed and imaged.

Either prior to or just after you are fitted with your head frame, a magnetic resonance imaging (MRI) and/or computerized tomography (CT) scan will be performed. These scans will provide your physician with the most up-to-date mapping of your brain so that s/he can pinpoint the exact location of the target areas. Next, a computerized mapping of your treatment is planned out by your neurosurgeon and radiation oncologist, which can require up to a few hours to complete.
Once the treatment plan has been completed, you will be asked to lie down and the head frame will be secured to the robotic Gamma Knife bed, which slides into the Gamma Knife Perfexion machine. Radiation is then delivered directly to the target area through openings inside the machine. The treatment phase can range in length from 30 minutes to a few hours.

When your treatment is complete, your head frame and IV will be removed and discharge instructions will be reviewed with you. You will be asked to remain for observation for 30 minutes to two hours. It is recommended that someone stay with you the first night after treatment to monitor you for any side effects from the procedure.

What can I expect after treatment?

For most conditions, results of Gamma Knife treatment develop over time, ranging from a few weeks to two years, because the Gamma Knife shrinks tumors and affects cells gradually. Patients are often monitored with MRI and/or CT scans until the full treatment effect is observed.

The Gamma Knife has proved to be a very effective means of controlling some tumors and other brain disorders. Depending on the condition, success rates can be as high as 70 percent to 90 percent; however, there is no guarantee of individual results. Outcome depends on the size, location and type of lesion, as well as your personal medical history. You should discuss your expectations with your physician before treatment.

ARE THERE ANY POTENTIAL SIDE EFFECTS TO GAMMA KNIFE TREATMENT?

As with any surgery, there are risks and potential side effects with Gamma Knife radiosurgery. These side effects could include:

- Minimal discomfort, headache or pain the day after radiosurgery. Non-aspirin pain medication, such as ibuprofen or acetaminophen, is recommended if you have this level of discomfort.
- Infection at the head frame’s pin sites. It is recommended that you keep these areas thoroughly clean following your procedure.
- Brain swelling, for which there is a small risk after the procedure.

If you experience nausea, vomiting, severe headaches, visual changes, difficulty speaking, seizure, hearing loss, facial weakness or any other symptoms unusual for you, please contact your physician immediately or go to the nearest emergency room.
Why choose Cleveland Clinic?

Part of Cleveland Clinic’s multidisciplinary Neurological Institute, the Rose Ella Burkhardt Brain Tumor and Neuro-Oncology Center is a nationally recognized leader in the diagnosis and treatment of primary and metastatic tumors of the brain, nerves and spine and their effects on the nervous system. The center collaborates with the Taussig Cancer Institute to provide innovative solutions for these complex problems, utilizing the latest technology, including intraoperative MRI, stereotactic radio-surgery, convection-enhanced delivery and laser interstitial thermal therapy.

Cleveland Clinic’s neurology and neurosurgery programs were named among the country’s best in U.S. News & World Report’s 2014 “Best Hospitals” survey. In addition, we hold the top ranking for these programs in Ohio. Taussig Cancer Institute has also been named the top-ranked in Ohio.

Both institutes house physicians, scientists and researchers focused on the study and treatment of brain tumors. While there are many brain tumor treatment options, Cleveland Clinic’s experienced and expert Gamma Knife Center team offers innovative solutions for even the most complex diagnoses.
Cleveland Clinic Gamma Knife Specialists

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Andre Machado, MD, PhD

Mark Bain, MD
Erin Murphy, MD

Gene Barnett, MD, MBA
Director, Rose Ella Burkhardt Brain Tumor and Neuro-Oncology Center

Sean Nagel, MD

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Pablo Recinos, MD

Kambiz Kamian, MD
Violette Recinos, MD

John Suh, MD
Michael Vogelbaum, MD, PhD
Erika Woodson, MD
Jennifer Yu, MD

For more information about our staff, including complete profiles, visit clevelandclinic.org/staff.

Contacting Cleveland Clinic

Ready to schedule an appointment with a specialist?

If you would like to set up a consultation with a Cleveland Clinic Gamma Knife specialist, please call 216.636.0007 or toll-free 866.588.2264.
Still have questions about Gamma Knife?

If after reviewing this guide, you have additional cancer-related questions, Cleveland Clinic’s Cancer Answer Line can help. Two oncology clinical nurse specialists and their staff can provide information and answer questions about cancer. The Cancer Answer Line is operational from 8 a.m. - 5 p.m., ET, Monday - Friday. Please call toll-free 866.223.8100.

Need a second opinion?

Our MyConsult® service offers secure online second opinions for patients who cannot travel to Cleveland. Through this service, patients enter detailed health information and mail pertinent test results to us. Then, Cleveland Clinic experts render an opinion that includes treatment options or alternatives and recommendations regarding future therapeutic considerations. To learn more about MyConsult, please visit clevelandclinic.org/myconsult.

Are you traveling out-of-state to come to Cleveland Clinic?

Our Medical Concierge team is here to help you prior to your arrival. After your medical appointment is scheduled, our patient representatives can help with any additional arrangements including:

- Hotel or lodging arrangements in Cleveland
- Ground transportation to and from the airport and hospital
- Airline reservations
- Interpreter arrangements

To learn more about our Medical Concierge service, please visit clevelandclinic.org/medicalconcierge.

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Get wellness tips, healthy gourmet recipes, essential health news and free downloadable health guides straight to your inbox. Sign up today at clevelandclinic.org/bewell.

Like us on Facebook at facebook.com/clevelandclinic

Explore our services, locations and more at clevelandclinic.org

Find a wealth of family health & wellness tips at clevelandclinic.org/healthub

MyChart

Cleveland Clinic MyChart® is a secure, online personal healthcare management tool that connects patients to their medical record. Patients can register for MyChart through their physician’s office or by going online to clevelandclinic.org/mychart.
The Neurological Institute is a leader in the diagnosis and treatment of common and complex neurological disorders of adult and pediatric patients. Its more than 300 specialists combine expertise and compassion to achieve measurably superior results. By promoting innovative research and integrated care models, the Neurological Institute accelerates the adoption of new treatments and technologies into patient care. The Neurological Institute is one of 27 institutes at Cleveland Clinic, a nonprofit academic medical center ranked among the nation's top hospitals (U.S. News & World Report), where more than 3,000 physicians and researchers in 120 specialties collaborate to give every patient the best outcome and experience.

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