

METASTATIC BRAIN TUMOR  
TREATMENT CENTER OF VIRGINIA

# MBTC

## A Patient's Guide to Understanding Brain Metastasis





# HOW TO USE THIS BOOKLET

This booklet is designed to give you, the patient, and your family a brief education about metastatic brain tumors and treatments offered through Dr. K. Singh Sahni and the team of other doctors, nurses, nurse practitioners, case managers, and nurse navigators.

We have tried to explain difficult terms and concepts in layman's terms. For instance, you will find unfamiliar medical terms in bold explained within the text and in the glossary that follows. This is intended to provide a basic overview and is by no means exhaustive or all inclusive. You are encouraged to discuss any specific questions with your team of physicians.

The information provided in this booklet educates our patients about different treatment options and re-enforces our commitment to treating our patients with the most modern and sophisticated methods in a compassionate manner.

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# INTRODUCTION

When cancer originates in another body part and spreads to the brain, it is called a **Metastatic Brain Tumor**. When cancer originates within the brain itself, it is called a primary brain tumor. In this booklet, we will limit our education to Metastatic Brain Tumors.

## **Solitary Metastatic Brain Tumor:**

When only one brain tumor is seen on the scans of a patient with a known cancer diagnosis elsewhere in the body, such as the lungs, breasts or another organ.

**Brain Metastases:** Two or more tumors in the brain originating from another part of the body.

Patients with cancer are at risk for metastasis to the brain. The most common metastatic brain tumors occur in patients with lung cancer, breast cancer, melanoma and renal cancer. In the last decade, medical oncologists have made remarkable strides in cancer treatment. With the addition of immunotherapy and more targeted treatment methods, cancer patients are living much longer.

**Blood Brain Barrier (BBB):** The human brain is protected by a very selective barrier made of tightly packed cells. This barrier allows important nutrients to enter the brain while keeping certain toxins out. Unfortunately, this mechanism works against most chemotherapy and some immunotherapy agents used to treat cancer. In other words, agents that help treat cancer in the other body parts may not help with a tumor that has **metastasized** (spread) to the brain.

A great deal of research and progress has been made in the last few years, and new drugs with better BBB penetration will likely be available in the future.

## TEAM APPROACH

The most common sites of origin for brain metastases are the lungs, breasts, colon, renal organs, and the skin (melanoma). If more than one body part is involved, a team approach is needed for better patient treatment.

At the **Metastatic Brain Tumor Treatment Center of Virginia (MBTC)**, we treat each individual patient with respect and compassion and offer the most comprehensive treatment methods. We do this by closely coordinating care with the patient's medical oncologist, radiation oncologist, neurosurgeon, and primary care physician.



We hold a weekly conference in which our team of doctors come together to discuss some of our complex patients and determine the best individualized treatment approach for such patients. With multiple opinions from doctors that specialize in different disciplines, we come up with the best individualized treatment plans for our patients.

This weekly conference, moderated by Dr. Sahni, includes radiation oncologists, medical oncologists, neurosurgeons, neurologists, neuroradiologists, internists, radiology techs, and nurses.

Dr. Sahni always makes a point to discuss your status with the referring oncologist who may not be able to attend this conference. The available expertise in this conference helps us gather input and insight into the formulation of an individualized treatment strategy.

# SYMPTOMS & DIAGNOSIS

It is not uncommon for a patient with a metastatic brain tumor to have no neurological symptoms. For many patients, a small tumor may be detected when getting an MRI or a CT Scan for staging purposes before any symptoms are experienced.

The most common symptom manifestations are seizures and headaches. Other symptoms may include neurological deficits such as changes in memory, vision, and balance. We recommend that patients known to have cancer with any of these symptoms bring it to the immediate attention of the treating physician.

The best way to diagnose a metastatic brain tumor is to perform an MRI scan with and without contrast. If an MRI is not possible, our next scan of choice is a CT scan with and without contrast.



# TREATMENT OPTIONS

1. **Microsurgery**
2. **Stereotactic Radiosurgery**  
Gamma Knife or Linac Based
3. **Whole Brain Radiation**
4. **Chemotherapy and Immunotherapy**

Your first visit to the Metastatic Brain Tumor Treatment Center will involve a comprehensive consultation. You and your family will meet Dr. Sahni and his nurse practitioner. They will go over your scans with you and your family, and you will get to see the actual scans. In most cases, Dr. Sahni will have already discussed your case with your oncologist and/or neurosurgeon, and reviewed the data provided to him. We strongly believe in a team approach and will always make sure that your oncologists are in agreement with the final treatment option individualized for your care.

## 1. **Microsurgery**

Patients with one or two large tumors are sometimes best managed with a **microsurgical resection** of the tumor. Dr. Sahni works with some of the best board certified neurosurgeons who are highly skilled in microsurgical resection of metastatic brain tumors.

This group of surgeons covers most of the facilities in the Richmond metropolitan area in Virginia and provides surgical services in the facility selected by the patient and the oncologist.

If you are seeing Dr. Sahni after having your surgery, we recommend that you call our office immediately (804-330-7099) for your first consultation. Some surgeons elect to have Dr. Sahni provide the post operative care while others may wish to follow you until the sutures have been removed. In either case, Dr. Sahni will keep your surgeon informed of your postoperative condition.

Microsurgery is usually very well tolerated and most patients are discharged from the hospital within three to four days. If your recovery after surgery is going a bit slow, you may be placed in a rehab center on a short term basis for quicker recovery. In that case, be sure to call Dr. Sahni's office for an appointment to be seen as soon as you are discharged.

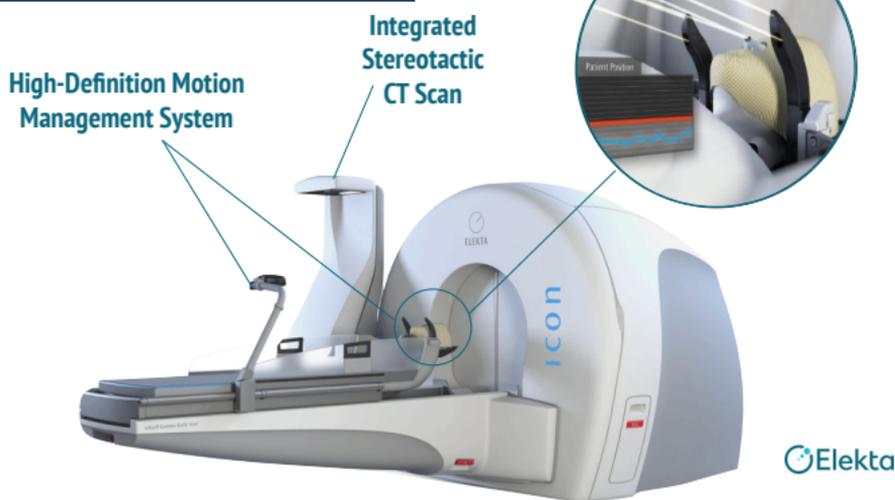
## **2. Stereotactic Radiosurgery**

Radiation that is delivered in a very targeted fashion only to the tumor sparing the surrounding normal brain is called stereotactic radiosurgery. Stereotactic radiosurgery may be done in a single session or up to five sessions. This form of treatment can be done by Gamma Knife or Linac based machines.

# Gamma Knife (GK)

Gamma knife is the only form of stereotactic radiosurgery which is specifically used to treat brain tumors and other conditions of the brain. It is a highly sophisticated and accurate form of treatment for brain tumors that has changed the outcome of patients with brain metastasis. Gamma Knife can be used to treat one or multiple brain tumors in a single day as an outpatient. The latest version of GK is called ICON. Patients can undergo treatment with this machine using a frame or a mask. A very high dose of radiation is delivered to the tumor with acute precision, sparing the healthy tissue surrounding the target.

## GK ICON with Mask



## Frame Based Targeted GK



# GK TREATMENT

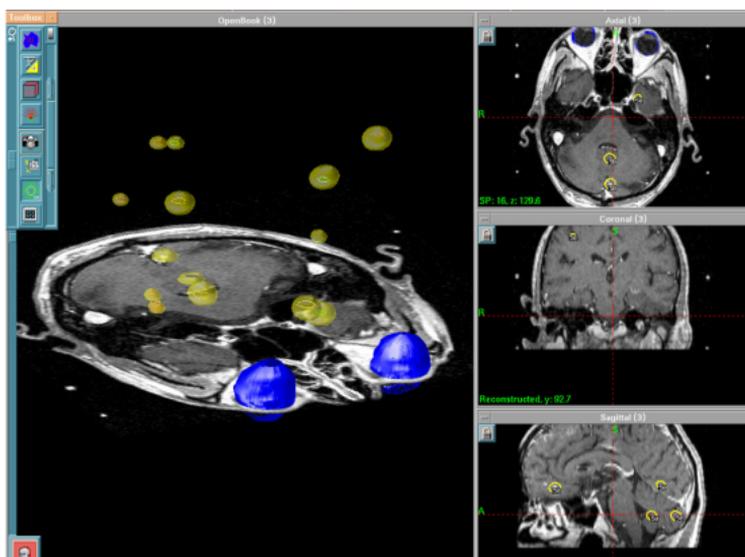
A few days prior to treatment, patients are contacted by the GK Center nurses. Our nurses are compassionate, skillful, and experienced. They will review treatment details with the patient and/or companion.

GK can either be done with a frame placement or a frameless mask, determined by the neurosurgeon and radiation oncologist, based on the tumor size and location. Patients arrive early in the morning and are greeted by our nurses. Up to two family members may join the patient in a private suite.

After the registration process is complete, the patient meets the radiation oncologist and anesthesia team. We use sedation to provide a more comfortable experience for our patients who require a frame placement. This procedure, called monitored anesthesia, is very similar to the anesthesia used for a colonoscopy or other minor procedures. If you are being prepared for a frame placement, it is unlikely that you will remember this part of the procedure.

An MRI is done upon completion of the frame placement. This MRI is then studied by Dr. Sahni and the entire team to create an individualized treatment plan. This process involves high level consultations between the neurosurgeon, radiation oncologist, and medical physicist.

## Multiple Metastatic Brain Tumors Treated in One Session

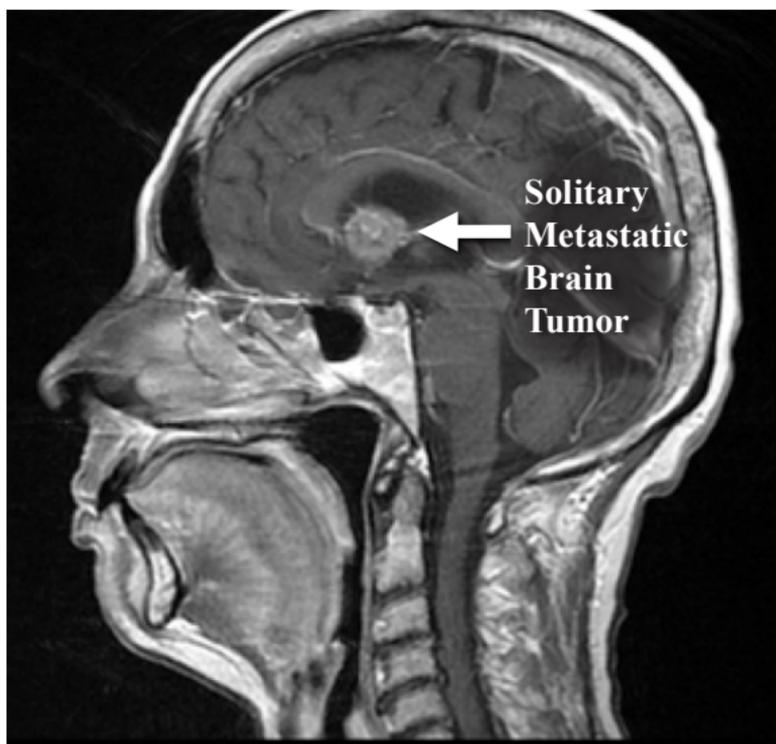


Once the treatment plan (which involves a dose of radiation), the trajectory of the treatment, and the number of tumors is determined, the patient is taken to the treatment room. Families may wait in the patient's suite or in the lobby. The duration of the treatment depends on the number and complexity of tumors. GK is the most accurate and safe form of treatment when the tumor is located in a very sensitive area, such as the brain stem.

Upon completion of treatment, the patient is brought back to the suite and the frame is removed. Afterwards, the patient's family may join the patient again. Once the anesthesia wears off, the patient is discharged to go home.

For some patients, steroids and seizure preventive medications may be needed. Your team of doctors and nurses will go over all this with you.

## Before Gamma Knife Treatment



## 3 Months After GK Treatment



## **Follow Up**

We recommend one to two days off work after radiosurgery to stay home before resuming regular activities. Patients are advised to follow up with Dr. Sahni two months after any treatment.

An MRI is done before the follow-up visit. This is important because it can detect any new tumors before the patient becomes **symptomatic**. Unlike whole brain radiotherapy, which can be done only once, GK can be done as often as needed to treat new tumors. Your oncologist will be informed about your treatment and you should not miss your appointments with their office. If for some reason, you are not contacted for your follow-up appointment, call (804) 330-7099 and ask for Dr. Sahni's nurse to arrange your MRI.

## **Linac-Based Radiosurgery**

Conventional linear accelerators have been refined to deliver radiation specifically to brain tumors, similarly to how they deliver radiation to the lungs or prostate. This is an acceptable alternative when patients have large tumors that are not located close to the brain stem. It is usually done with a mask. We do not use this technology if the tumor is small, or if it is too close to important structures such as the brain stem or optic nerves.

Dr. Sahni works closely with some of the most highly skilled radiation oncologists in town to provide this treatment using

“**TrueBeam**” Linac-Based Radiosurgery. During your first consultation, these options and alternatives are discussed in detail. Patients are instructed to follow up with Dr. Sahni two months after this treatment for a new scan, just like GK patients.

### 3. **Whole Brain Radiation**

When a patient receives radiation to the entire brain it is called FWBRT, or fractionated whole brain radiotherapy. Usually completed within 10-14 days, this is the conventional radiation most patients with brain metastasis used to receive.

In some patients, FWBRT may unfortunately lead to cognitive deficit. Now that cancer patients have a much better long-term prognosis with the advent of newer treatment modalities, we do not recommend this form of treatment as our first approach. At MBTC, we have limited its use for patients with diffuse multiple brain tumors or those with **leptomeningeal** disease. Leptomeningeal means the cancer cells have spread along the cerebrospinal fluid or the brain lining, called the meninges. This form of treatment does not involve the neurosurgeon, but your radiation oncologist will discuss the treatment details.

Patients undergoing FWBRT are still advised to call Dr. Sahni’s office for a follow-up scan and visit in two months. Patients who respond well to FWBRT may

develop new tumors after the treatment and they can still be treated with Gamma Knife depending on their clinical condition. Regardless of the mode of treatment, we strongly encourage a close follow-up with both your oncologist and your neurosurgeon.

#### **4. Chemotherapy and Immunotherapy**

Medical oncologists have made big strides in the last decade to improve the quality of life and long-term survival rate of cancer patients. BBB has continued to be a challenge in allowing these drugs to have good results on cancer cells in the brain.

While early results have been optimistic in both immunotherapy and targeted therapy, the best treatment options for treating brain metastasis is still direct microsurgery and/or radiosurgery.

Dr. Sahni works very closely with your medical oncologist to provide you with the best and most precise treatment option for the brain metastasis. We make a point to always keep your oncologist well-informed and coordinate the timing of the treatment with the oncologist's office.



Dr. K Singh Sahni, M.D., F.A.C.S., F.A.A.N.S., is the President of Neurosurgical Associates, a group of nine neurosurgeons in Richmond, VA. After completing his residency at VCU in 1983, Dr. Sahni served as a faculty member in VCU's Department of Neurosurgery. He established the Gamma Knife Center at Johnston Willis Hospital in 2004. He is currently the Director of the Gamma Knife Center and Chairman of the Neuroscience Department. He is among a few neurosurgeons nationally to have limited his practice exclusively to the abnormalities of the brain and cranial nerves.

Dr. Sahni obtained his Gamma Knife training in the U.S. and in Stockholm, Sweden, where the Gamma Knife was first invented. He has done over 3000 Gamma Knife procedures, the majority of which have been for patients with brain tumors. When managing patients with brain metastasis, he firmly believes in collaboration with the oncologists. He is very proud of his nursing team, and together they provide personal, compassionate, and state-of-the-art treatment to their patients. Dr. Sahni believes each patient and their family deserves the same treatment as his own family.

# GLOSSARY

**Brain Metastases:** Two or more tumors in the brain originating from another part of the body

**Leptomeningeal:** Cancer cells that may have spread along the cerebrospinal fluid or the brain lining called the meninges

**Metastatic Brain Tumor:** Cancer that originates in another body part and spreads to the brain

**Metastasize:** To spread

**Microsurgical resection:** A minimally invasive procedure that consists of a removal of a small section of the skull in order to enter the brain

**Solitary Metastatic Brain Tumor:** Only one brain tumor is seen on the scans of a patient with a known cancer diagnosis elsewhere in the body, such as the lungs, breasts, or another organ.

**Symptomatic:** Displaying the symptoms of a disease



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