Brain Tumors

SNMMI SOCIETY OF NUCLEAR MEDICINE & MOLECULAR IMAGING

The information contained on this page is for general information purposes only. The information below describes what is on the horizon for molecular imaging in brain tumors and is currently being researched and/or has limited use at this time until approved.

A primary brain or spinal cord tumor is a tumor that starts in the brain or spinal cord. In 2023, an estimated 24,810 adults (14,280 men and 10,530 women) in the United States will be diagnosed with primary cancerous tumors of the brain and spinal cord. A person's likelihood of developing this type of tumor in their lifetime is less than 1%. Brain tumors account for 85% to 90% of all primary central nervous system (CNS) tumors. Worldwide, an estimated 308,102 people were diagnosed with a primary brain or spinal cord tumor in 2020.

It is estimated that 5,230 children under the age of 20 will also be diagnosed with a CNS tumor in the United States in 2023.

Brain tumors are of two types: benign (not cancer) and malignant (cancer). The benign brain tumors grow slowly and do not spread to other parts of the brain. The most common benign tumor is a meningioma. These tumors can cause symptoms when they start compressing important structures in the brain.

There are two types of malignant brain tumors:

1. Primary malignant brain tumors, which arise from the brain itself, for example, glioma.
2. Secondary or metastatic tumors, which originate in other parts of the body and then spread to the brain. Metastatic brain tumors are more common than primary brain tumors. Common tumors that can spread to the brain are tumors of lung, breast, melanoma, kidney, and colon.

The treatment options for brain tumors include surgery to remove the tumor, chemotherapy, and radiation or combination therapy. Effective treatment depends on an accurate diagnosis, assessment of the location and extent of disease at the time of diagnosis, as well as how the patient responds to treatment.

Role of molecular imaging in Brain tumors?

Molecular imaging can help to diagnose brain tumors, understand the metabolic behavior of the tumors, and differentiate between tumors and non-tumor conditions. It can be used to determine the extent or severity of the disease, select biopsy site to confirm the diagnosis and select the most effective therapy based on the unique biologic characteristics of the patient and the molecular properties of a tumor. Molecular imaging can also be used during and after the treatment to evaluate the extent of surgical resection, determine a patient's response to specific drugs, accurately assess the effectiveness of a treatment regimen, assess for recurrence after treatment, and for long-term follow-up of the brain tumors.

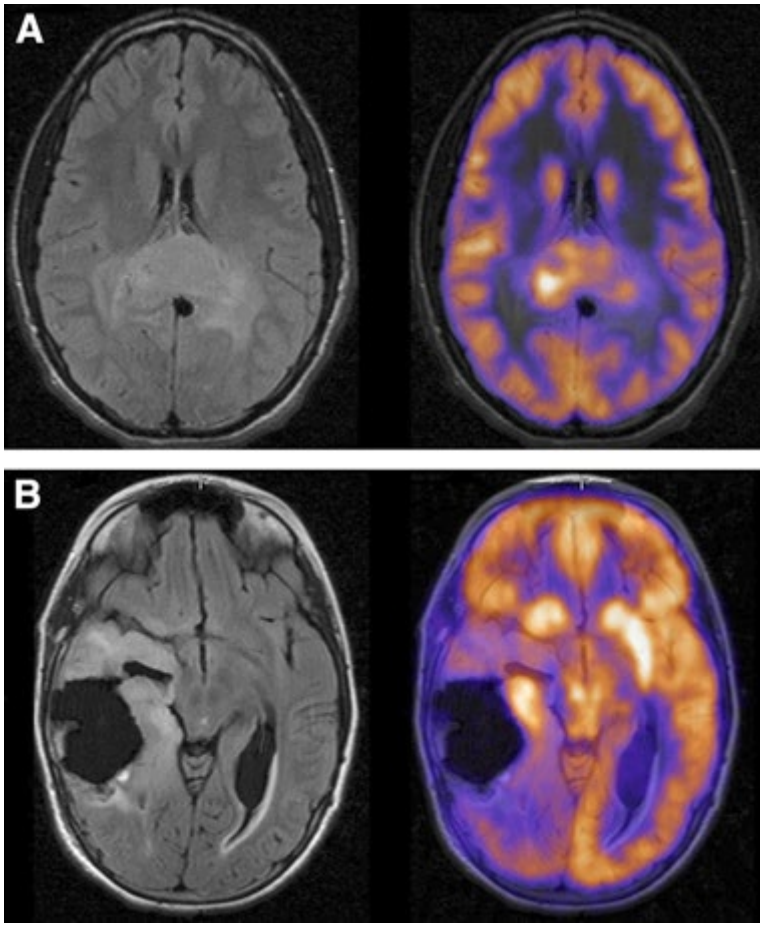

FIGURE (Adapted From**): (A)** Flair-MRI (left) and fused PET-MRI (right) in an 18-y-old boy with newly diagnosed Glioblastoma Multiforme showing uptake of ^{18}F-fluorodeoxyglucose (^{18}F-FDG) in the tumor (red arrows). **(B)** Flair-MRI (left) and fused PET-MRI (right) in an 11-y-old girl with recurrent Glioblastoma Multiforme showing uptake of ^{18}F-FDG in the tumor (yellow arrows).[1]

1. Zukotynski, Katherine, et al. "18F-FDG PET and MR imaging associations across a spectrum of pediatric brain tumors: a report from the pediatric brain tumor consortium." *Journal of Nuclear Medicine*9 (2014): 1473-1480.

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- Fact Sheet: Molecular Imaging and Colorectal Cancer
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The material presented in this pamphlet is for informational purposes only and is not intended as a substitute for discussions between you and your physician. Be sure to consult with your physician or the nuclear medicine department where the treatment will be performed if you want more information about this or other nuclear medicine procedures.