

## Childhood Brain Tumors

Brain tumors are the second most common of all childhood cancers, following only leukemia. Brain tumors are diagnosed most often in children between 3 and 8 years old, but can occur at any age. They occur slightly more often in boys than in girls.

Because the brain and the spinal cord are very complex, several types of cancer can be found in these areas. Symptoms depend on where the brain tumor is located. Brain tumors are usually found because the brain regulates many vital functions and when these vital functions are disrupted, signs and symptoms appear quickly. The brain is enclosed by bone with no room to expand, so if the tumor presses on an area of the brain, symptoms may develop early. Brain tumors are usually found before they spread to other parts of the body.

### **What are the common signs and symptoms of brain tumors?**

Most childhood brain tumors occur somewhere in the midline of the brain. Brain tumors found in adults, however, usually develop away from the midline and are often the result of metastatic disease from some other area of the body. Initial symptoms of brain tumors are headache, vomiting, blurred vision, swelling around an eye (papilledema), and behavior and mood changes. These symptoms usually result from increased pressure within the skull due to edema (swelling) around the tumor or to a blockage of cerebral spinal fluid (CSF) resulting in hydrocephalus (sometimes called “water on the brain”).

### **Where are brain tumors located?**

The specific effects of a brain tumor depend on its precise location in the brain. Direct invasion of normal tissues or tissue compression are the usual causes of symptoms.

Tumors of the brain can cause one or several of these symptoms: balance problems, nausea and vomiting, muscle weakness in the face, difficulty swallowing, difficulty speaking, abnormal eye movement, headache, abnormal head tilt, and personality changes. Even very small tumors in the brain stem can cause serious symptoms.

Tumors of the optic chiasm, of the thalamus, and of the sellar or suprasellar region produce such signs and symptoms as headaches, nausea, impaired eye movement and vision, changes in personality, changes in endocrine function (such as increased thirst and urination) and changes in growth patterns over time.

Posterior fossa tumors are found in the fourth ventricle, cerebellum, pons, and medulla. They usually become noticeable because of increased pressure within the skull caused by the blockage of cerebrospinal fluid (CSF) flow from the ventricles. Tumors in this area cause a number of coordination problems, including unsteady walking, swaying and staggering, tremors, and difficulty with speech.

Parietal lobe tumors are relatively rare in children. The most common early symptom is seizures, but speech problems and a loss of the ability to write may also occur. Temporal lobe tumors are also rare in childhood. The most common symptom is seizures.

In addition, there are a variety of other less common brain tumors. Should your child have one of these tumors, your doctor will provide you with the appropriate information and reading materials.

## **What types of tumors can be found in the brain?**

The effects of a brain tumor are determined not only by its location but also by the histologic (cell) type of the tissue it contains. The brain tumors found most often in children are medulloblastomas, astrocytomas, ependymomas, and primitive neuroectodermal tumors. By looking at the tissue under a microscope, a neuropathologist can identify the tumor type.

Medulloblastomas usually occur in the area of the brain called the posterior fossa. This type of tumor can be metastatic- that is, it can spread outside the brain. Surgical removal followed by whole-brain and spinal cord irradiation is standard therapy. Chemotherapy may also be recommended. In children younger than 3 years old, the recommended treatments are usually surgery and chemotherapy. Radiotherapy may be given when the child is older.

Astrocytomas can be graded from 1 through 4 according to degree of severity. A grade 4 astrocytoma may also be called a glioblastoma multiforme. The lower the number, the less likely the tumor is to spread or recur. Generally a low-grade astrocytoma in the posterior fossa that is surgically removed does not need additional therapy, and the cure rate is high. For other grades of astrocytomas, radiotherapy and possibly chemotherapy are the recommended treatments.

Ependymomas occur in the lining of the brain. Most often they, like medulloblastomas, are found in the posterior fossa area. They can also develop along the spinal cord. Standard therapy is radiotherapy, and chemotherapy may be recommended.

Primitive neuroectodermal tumors are usually highly malignant and behave aggressively. They can occur any place in the brain but are more often found in the frontal, temporal, or parietal lobes. Aggressive treatment with surgery, radiotherapy, and chemotherapy may improve the patient's chances for survival.

Oligodendrogliomas are relatively rare tumors and are usually "mixed," that is, they normally have another type of tumor cell associated with them. They are usually found in the cerebrum and grow slowly. Generally, the only treatment for this type of tumor is surgery. Radiotherapy or other treatments are reserved for use if the tumor recurs or spreads to other areas.

## **How are brain tumors diagnosed?**

Brain tumors are diagnosed by computerized tomography (CT), magnetic resonance imaging (MRI), and tissue examination. When the diagnosis identifies a tumor that can metastasize, the physician looks for signs of spread. Common sites for metastasis include the spinal cord and cerebral spinal fluid. The physician may request further studies using lumbar puncture, bone marrow aspiration, bone marrow biopsy, biochemistry, an MRI of the spine, and a bone scan to determine whether the tumor has spread. For younger children, or children who are unable to stay still for these tests, sedation may be used for certain procedures.

## **How are brain tumors treated?**

A multidisciplinary approach is used for treatment of brain tumors. Treatment is based on the type of brain tumor. Surgery, chemotherapy, and/or radiotherapy may be used. The initial step in treatment for brain tumors is surgical removal. The goal is to remove the tumor completely when possible. When this is not possible, the goal is debulking, meaning the removal of as much of the tumor as possible without causing additional damage.

Surgery is often followed by chemotherapy and/or radiotherapy. Children less than 3 years old usually do not receive radiotherapy because it affects the developing brain, usually producing long-term cognitive deficits. Instead, children younger than 3 years old who require additional therapy receive chemotherapy. In addition, chemotherapy is recommended during or after radiotherapy for some children, such as those whose tumor recurs. There are a variety of chemotherapy options which your doctor will discuss with you.

Radiotherapy may be given daily for 6-8 weeks. A physician visit will be scheduled once a week. Chemotherapy may be administered daily by mouth, once a week by injection, or once a month by infusion over several days.

Many brain tumors are accompanied by swelling around the tumor that increases the severity of symptoms. A drug called dexamethasone (also called Decadron<sup>®</sup>) is available to help relieve some of these symptoms. It helps decrease swelling that the tumor can cause.

## **How often will I return for follow-up visits?**

How often your child should return for a follow-up depends on the type of tumor and therapy. Usually, when treatment is only surgery or surgery and radiation, you can expect your child to have an MRI study approximately every 3 months for the first year, then every 4 to 6 months for the next year, followed by yearly studies.

A spinal tap may be recommended after the doctor reads the CT or MRI scan to evaluate CSF for the presence of cancer cells and to measure the levels of certain enzymes and chemicals. For children who are actively receiving chemotherapy, the general rule for the timing of spinal taps is every 3 months, or sooner if needed. Your doctor may change this plan depending on the type of treatment your child receives and his or her physical condition.

Neuropsychological studies are part of the continuing evaluation of the effects of the brain tumor and its treatment on the growing child. The information from these tests can be used to help teachers plan for the child's schooling. Additionally, there are other studies that may be required, such as vision, hearing, and endocrine tests to monitor your child's growth and to help assess other effects of the brain tumor and its treatment.

## **What patient education materials are available on brain tumors?**

We have many patient education materials at MD Anderson Cancer Center about brain tumors that you may find helpful. For example, The Learning Center has several resources from both the American Brain Tumor Association (ABTA) and the National Brain Tumor Foundation (NBTF) that you can obtain free of charge. Also, our nursing staff will provide you with written information about any special procedures that you may have while you are here. If you have any questions or concerns, please talk with your nurse or physician.

The Learning Center locations include:

Main Building, Floor 4, near Elevator A, Room R4.1100  
Monday through Friday, 9 a.m. to 4 p.m.  
Thursday, 9 a.m. to 7 p.m.  
(713) 745-8063

Mays Clinic, Floor 2, near The Tree Sculpture, Room ACB2.1120  
Monday through Friday, 9 a.m. to 4 p.m.  
(713) 563-8010

The Mays Clinic Learning Center also has a Business Center for visitor use.  
This center has computers with Internet access, a fax machine and copier.

Jesse H. Jones Rotary House International  
Monday through Friday, 7 a.m. to 8:30 p.m.  
Saturday, 10 a.m. to 4 p.m.  
Sunday, 1:30 p.m. to 8:30 p.m.  
(713) 745-0007