INFORMATION ABOUT CHILDHOOD BRAIN TUMORS

WHAT ARE BRAIN TUMORS?

Brain tumors in children include a variety of diseases that involve the abnormal growth of tissues contained within the skull. These may include tumors that are both benign (non-cancerous) and malignant (cancerous). Brain tumors are the second most common cancer in children.

WHAT ARE THE FUNCTIONS OF THE BRAIN?

The brain is one of the most important organs in the body. It controls very important functions such as memory, senses, emotion, and the activity of nerves, blood vessels and muscles.

WHAT ARE THE TYPES OF BRAIN TUMORS?

There are many types of brain tumors, depending on how they look under microscopic examination. Tumors with cells that are very abnormal-looking are also referred to as “high-grade” tumors and tend to demonstrate aggressive behavior. Some of the brain tumors seen in children include the following:

1. Medulloblastoma – arise from poorly developed and immature brain cells
2. Astrocytoma – arise from star-shaped cells in the brain called “astrocytes”
3. Ependymoma – arise from cells that line the hollow cavities within the brain
4. Malignant Glioma – arise from cells that normally function to protect and support nerve cells, also called “glial” cells
5. Craniopharyngioma – arise from cells located just above the pituitary gland
6. Germ Cell Tumors – arise from primitive cells from which ovaries and testes are derived

WHAT ARE THE CAUSES OF BRAIN TUMORS IN CHILDREN?

The cause of most brain tumors is unknown. Although there have been reported associations between the development of brain tumors and rare genetic conditions and environmental exposure, there are no reliable and consistent data to date regarding a cause and effect relationship related to genetics and the environment.

WHAT ARE THE SYMPTOMS OF BRAIN TUMORS?

Children with brain tumors may present with varying signs and symptoms depending on the size, location and rate of growth of the tumor. The most common complaint is related to increased pressure inside the skull, such as headache (usually in the morning) and vomiting. Other findings include impaired vision (double vision, blurring or loss of vision), squinting, convulsions, disturbed gait and balance, irritability, increased sleeping time, unexplained changes in behavior, personality or school performance, etc.

HOW IS THE DIAGNOSIS OF A BRAIN TUMOR MADE?

Once suspected, a careful health history, physical and neurologic examination will be performed as well as several tests done to prove the diagnosis of a brain tumor, determine its particular type and grade and to determine whether it is localized in the brain or has spread elsewhere in the body.

A family history of cancer is generally asked, as well as the patient’s past illnesses and treatments.

Various imaging tests will be requested, such as a CT (Computerized Tomography) scan, and MRI (Magnetic Resonance Imaging) or a Positron Emission Tomography (PET) scan to better locate and characterize the tumor.

A pediatric neurosurgeon will obtain a piece of tissue (biopsy) as much as possible so that microscopic examination can be done to determine specific type and grade.

Other tests that may be requested include a complete blood count, baseline liver and kidney function tests, baseline hearing and heart function tests and in suspected spread of disease to other parts of the body, a CT scan of the chest, and a bone scan. Special blood tests to look for tumor markers associated with specific types of tumors such as alpha-feto protein or beta-human chorionic
gonadotropin may be requested. A lumbar tap or examination of the fluid surrounding the brain and spinal cord may be necessary in some types of brain tumors. Also, a bone marrow aspiration and biopsy may also be necessary to determine if the bone marrow is affected by the disease.

**How does one stage brain tumors?**

Staging refers to the process used to follow to find out if the cancer stays within the affected body part or has spread to other parts of the body. Knowing disease stage is important for treatment planning in many types of childhood cancer.

For the different brain tumors, there is no uniform staging system. For brain tumors, grouping is based either on grade (tumor aggressiveness) or risk groups (depending on whether the tumor remains within the brain or has spread to the spinal cord or other parts of the body).

**How is the treatment planned and who are involved in the treatment?**

In planning the treatment for a child with brain tumors, factors that impact on the chance of recovery such as grade and risk group are taken into consideration.

The pediatric oncologist, pediatric neurologist and pediatric neurosurgeon, will be primarily involved in the management of children with brain tumors. At the same time, the expertise of other medical professionals is required for complete care of the child (also called multidisciplinary care) - for diagnosis, treatment and supportive care. These include radiologists, pediatric surgeons, oncology nurses, pharmacists, psychologists, social workers, physical and occupational therapists, etc. The members of the multidisciplinary care team all contribute to the treatment and support of the child.

**What are the available treatment options for brain tumors?**

The treatment modalities available for a child with a brain tumor include surgery, radiotherapy and chemotherapy. The choice of treatment options depends on the type of tumor and its location.

Surgery is performed to remove as much of the tumor as possible and to provide tissue for diagnosis (biopsy). In case complete removal of the tumor is not possible, radiation therapy and/or chemotherapy may also be given.

Chemotherapy is the use of drugs to kill cancer cells. It may be given by mouth or injected through a vein or muscle (systemic therapy). Depending on the type of brain tumor, drugs that are known to be active against the specific cancer cells are given. The drugs may be given before (neoadjuvant) and/or after (adjuvant) surgery to kill remaining cells that may not be seen by any test or exam. Chemotherapy may also be given to very young children with brain tumors in order to avoid radiation therapy.

Radiation therapy uses high-energy X-rays or other radiation energy to kill cancer cells. Most childhood brain tumors are sensitive to radiation therapy. Radiation therapy may be given in one dose for several days or may be given in several small doses per day. Because a child’s growth and brain development may be adversely affected by radiation therapy, strategies are being developed in order to avoid administration of radiation therapy in very young children. Radiation therapy is administered by a radiation oncologist.

For patients with widespread disease or those who do not respond well to treatment, studies are now underway on the use of very high doses of chemotherapy followed by transplantation of blood forming stem cells. For these children, their own stem cells are used and is called an autologous transplant.

This information is made possible through the efforts of the Philippine Society of Pediatric Oncology, Inc. (PSPO), a subspecialty society of the Philippine Pediatric Society (PPS). For details regarding the treatment of individual patients, it is strongly recommended that they confer with their pediatric oncologist.