

Neuroblastoma for the Pediatric Patient

Each year about 600 children in the United States develop neuroblastoma. Neuroblastoma is one of the most common types of cancer in children and is usually found in children younger than five years old, making up half of all cancers in infants. This type of cancer rarely occurs in older children and teenagers. The cause of neuroblastoma is unknown. However, no chemicals or exposures of any kind have been linked to causing neuroblastoma.

About two-thirds of neuroblastoma tumors start in the adrenal glands (which sit on top of the kidneys) or in the nerve cells (next to the spinal cord) that control heart rate, blood pressure and digestion. The remaining neuroblastoma tumors begin in the chest, neck or pelvis. By the time many cases of neuroblastoma are diagnosed, the cancer has spread (metastasized) to the lymph nodes, liver, bones, the bone marrow, or other organs.

Neuroblastoma can be further divided into other, less common types:

- One type of neuroblastoma is called a ganglioneuroma, which does not grow or spread.
- Ganglioneuroblastoma, on the other hand, is a type of neuroblastoma that can grow and spread abnormally. Areas of this tumor, however, may be similar to a ganglioneuroma and not grow or spread.

What are the symptoms of neuroblastoma?

Early symptoms of neuroblastoma tumors are often vague and may include fatigue, weight loss and loss of appetite. As the tumor grows, symptoms usually depend on the location of the tumor.

- Abdominal tumors can cause stomach pain, loss of appetite or problems with urination or bowel movements
- Tumors pressing on the spinal cord can cause arm or leg weakness, resulting in difficulty moving or walking
- Cancer that has spread to the bone can cause bone pain
- Cancer that has spread to the bones around the eye can cause bulging eyes with dark circles under the eyes
- Other late symptoms may include fever, anemia and high blood pressure

How is neuroblastoma diagnosed?

If your child's doctor thinks your child has neuroblastoma, he or she will conduct a careful exam and order several diagnostic tests. These tests may be:

- An MRI scan – This test uses magnetic fields to create computerized pictures.
- A CT scan – This test uses an X-ray machine and a computer to create detailed pictures of the body, including 3-D images. It provides detailed information about the size, shape and position of a tumor.

- Urine and blood tests
- Bone marrow aspiration – The doctor removes a small sample of bone marrow (usually from the hip) through a needle and looks at it under a microscope.
- Biopsy – If a tumor is found, a biopsy will likely be performed to confirm the diagnosis. Doctors take a sample of tissue, usually during surgery, and look at it under a microscope.

These tests will determine the size and location of the tumor and whether it has spread to other parts of the body. This process is called staging, which is important to plan treatment.

Since symptoms caused by neuroblastoma are similar to symptoms of other, more common diseases and health problems, there may be a delay in making the diagnosis. An experienced pediatric oncologist or pathologist will be able to diagnose neuroblastoma once he or she reviews a biopsy of the tumor and the results of other tests.

Screening tests using urine samples generally will not find a neuroblastoma before it has spread throughout the body. For this reason, doctors **do not** recommend screening newborns or young children for neuroblastoma.

How is neuroblastoma treated?

Treatment for neuroblastoma consists of combinations of:

- Surgery
- Radiation therapy
- Chemotherapy
- Bone marrow transplantation

Treatments are given based on the stage of disease, the child's age and the tumor's location. Some low-risk neuroblastoma tumors will go away without any treatment, and others may be cured by surgery alone. However, many tumors, called high-risk neuroblastoma, will have tumor cells that have spread to other parts of the body when the tumor is first found and will require intensive combinations of treatment.

Doctors at the Children's Cancer Hospital at M. D. Anderson Cancer Center are working on developing new therapies that act in different ways to help treat patients with high-risk neuroblastoma. For more information about clinical trials, ask for a copy of "Clinical Trials at M. D. Anderson" booklet or visit our Web site at <http://www.clinicaltrials.org>