

## **Neuroblastoma - Childhood - Stages and Groups** [1]

This section has been reviewed and approved by the [Cancer.Net Editorial Board](#) [2], 04/2014

**ON THIS PAGE:** You will learn about how doctors describe neuroblastoma's growth or spread. This is called the stage. To see other pages, use the menu on the side of your screen.

Staging is a way of describing a cancer, such as where it is located, if or where it has spread, and whether it is affecting other parts of the body. Doctors use diagnostic tests to find out the cancer's stage, so staging may not be complete until all of the tests are finished. Knowing the stage helps the doctor to decide what kind of treatment is best and can help predict a patient's prognosis, which is the chance of recovery. There are different stage descriptions for different types of cancer. Once a diagnosis of neuroblastoma is confirmed, how much the tumor has grown and spread is evaluated or staged. The tumor's stage helps your child's doctor plan treatment.

There are two staging systems for neuroblastoma: INSS and INRGSS. Each is described below, followed by an explanation of risk groupings.

### **International Neuroblastoma Staging System Committee (INSS) system**

The following is a brief summary of each INSS stage:

**Stage 1:** The tumor can be removed completely during surgery. Lymph nodes removed during surgery may or may not contain cancer, but other lymph nodes near the tumor do not.

**Stage 2A:** The tumor is located only in the area it started and cannot be completely removed during surgery. Nearby lymph nodes do not contain cancer.

**Stage 2B:** The tumor is located only in the area where it started and may or may not be completely removed during surgery, but nearby lymph nodes do contain cancer.

**Stage 3:** The tumor cannot be removed with surgery. It has spread to regional lymph nodes (lymph nodes near the tumor) or other areas near the tumor, but not to other parts of the body.

**Stage 4:** The original tumor has spread to distant lymph nodes (lymph nodes in other parts of the body), bones, bone marrow, liver, skin, and/or other organs, except for those listed in stage 4S, below.

**Stage 4S:** The original tumor is located only where it started (as in stage 1, 2A, or 2B), and it has spread only to the skin, liver, and/or bone marrow, in infants younger than one. The spread to the bone marrow is minimal, usually less than 10% of cells examined show cancer.

### **The International Neuroblastoma Risk Group Staging System (INRGSS)**

The INRGSS was recently designed specifically for the newly-developed International Neuroblastoma Risk Group (INRG) pre-treatment classification system (see Risk groups, below). Unlike the INSS explained above, the INRGSS uses only the results of imaging tests taken before surgery and does not include surgical results or spread to lymph nodes to determine the stage.

**Stage L1:** The tumor is located only in the area where it started; no risk factors found on imaging scans, such as CT or MRI.

**Stage L2:** The tumor has not spread beyond the area where it started and the nearby tissue; risk factors are found on imaging scans, such as CT or MRI.

**Stage M:** The tumor has spread to other parts of the body (except stage MS, see below)

**Stage MS:** The tumor has spread to only the skin, liver, and/or bone marrow.

### **Risk groups**

Some children are cured with surgery alone or surgery with chemotherapy (see [Treatment Options](#) [3]), but others have a very aggressive disease that is difficult to treat. By using a combination of factors, doctors can usually predict how well treatment will work for a neuroblastoma tumor, or if it will come back after treatment.

The INRG classification system uses factors that best predict how well treatment will work to determine risk groups. The lower the risk group, the more successful treatment is likely to be. Using the following factors, neuroblastoma is classified as very low-risk, low-risk, intermediate-risk, or high-risk:

- The stage of the disease according to the INRG staging system
- Age when diagnosed
- Histologic category, such as maturing ganglioneuroma versus ganglioneuroblastoma, intermixed versus ganglioneuroblastoma, nodular versus neuroblastoma
- Grade or how similar the tumor cells are to normal cells
- *MYCN* gene status
- Changes to chromosome 11q
- Tumor cell ploidy (DNA content of tumor cells)

The Children's Oncology Group (COG [4]) uses the following factors to determine risk:

- The stage of the disease according to the INSS system
- Age when diagnosed
- *MYCN* gene status
- Tumor ploidy; this is only important for children younger than 18 months
- Tumor histopathology (how the cancer cells look under a microscope)

Descriptions of low-risk, intermediate-risk, or high-risk neuroblastoma are listed below.

### **Low-risk neuroblastoma**

- Stage 1 disease
- Stage 2A or 2B disease in which more than 50% of the tumor was surgically removed, except for a child with *MYCN* amplification
- Stage 4S disease, no *MYCN* amplification, favorable histopathology, and hyperdiploidy (having extra chromosomes)

### **Intermediate-risk neuroblastoma**

- Stage 2A or 2B disease with no *MYCN* amplification in which less than 50% of the tumor was removed with surgery
- Stage 3 disease in children younger than 18 months, no *MYCN* amplification
- Stage 3 disease in children older than 18 months, no *MYCN* amplification, and favorable histopathology
- Stage 4 disease in children younger than 12 months, no *MYCN* amplification.
- Stage 4 disease in children age 12 months to 18 months, no *MYCN* amplification, hyperdiploidy, and favorable histology.
- Stage 4S disease, no *MYCN* amplification, unfavorable histopathology and/or diploidy

### **High-risk neuroblastoma**

- Stage 2A or 2B disease and *MYCN* amplification
- Stage 3 disease and *MYCN* amplification
- Stage 3 disease in children age 18 months or older, no *MYCN* amplification, and unfavorable histopathology
- Stage 4 disease in children younger than 12 months and *MYCN* amplification
- Stage 4 disease in children between 12 months and 18 months old with *MYCN* amplification, and/or diploidy, and/or unfavorable histology
- Stage 4 disease in children 18 months or older
- Stage 4S disease and *MYCN* amplification

Treatment is then tailored according to the risk assigned to the disease. Most patients with low-risk disease receive surgery alone. Sometimes, infants with small localized tumor have been successfully watched closely without any surgery, called observation. Patients with intermediate-risk disease receive surgery and chemotherapy. In the Children's Oncology Group, the recently completed clinical trial for the intermediate-risk group varied the length of treatment such as the

number of cycles of chemotherapy. This resulted due to the presence or absence of tumor genetic changes in chromosomes 1p and 11q, tumor histology, tumor ploidy, stage, and age. A very intensive approach, often using several types of treatments, is used for patients with high-risk neuroblastoma. More information can be found in the [Treatment Options](#) [3] section.

*Information about the cancer's stage will help the doctor recommend a treatment plan. The next section helps explain the treatment options for neuroblastoma. Use the menu on the side of your screen to select Treatment Options, or you can select another section, to continue reading this guide.*

---

**Links:**

[1] <http://www.cancer.net/cancer-types/neuroblastoma-childhood/stages-and-groups>

[2] <http://www.cancer.net/about-us>

[3] <http://www.cancer.net/node/19430>

[4] <http://www.childrensoncologygroup.org/>