Neuroblastoma - Childhood - Risk Factors [1]

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ON THIS PAGE: You will find out more about the factors that increase the chance of developing this type of tumor. To see other pages, use the menu on the side of your screen.

For most types of cancer, a risk factor is anything that increases a person?s chance of developing cancer. Although risk factors can influence the development of cancer, most do not directly cause cancer. Some people with several risk factors never develop cancer, while others with no known risk factors do. For neuroblastoma, the term ?risk factor? is more commonly used to describe the factors that are used to predict how the tumor will grow and how well treatment will work (see Stages [3]).

Neuroblastoma occurs more often in boys than in girls. So far, no environmental factors have been shown to increase the risk of developing neuroblastoma. Rarely, more than one member of a family is diagnosed with neuroblastoma. Researchers have found inherited gene mutations (changes) that play a role in the development of neuroblastoma for children with a family history of the disease. Other genetic changes, called single-nucleotide polymorphisms or SNPs, may contribute to the development of neuroblastoma in children who do not have a family history.

Family history and genetic predisposition

Approximately 1% to 2% of children with neuroblastoma have a family history of the disease. Children with an inherited likelihood of neuroblastoma tend to develop the disease, on average, nine to thirteen months earlier than other children with neuroblastoma. In children who have a family history of neuroblastoma, the disease may occur in two or more organs.

Neuroblastoma tumors have been diagnosed in patients with congenital central hypoventilation syndrome (CCHS), a unique disorder of breathing control associated with Hirschsprung disease (HSCR). CCHS results from germline mutations (a mutation passed directly from parent to child) in the *paired-like homeobox (PHOX) 2B* gene. Germline *PHOX2B* alterations are present in the tumors of people with neuroblastoma and with CCHS and/or Hirschsprung disease. Rare germline *PHOX2B* mutations have also been found in patients who are genetically predisposed to neuroblastoma.

Most of the time, when multiple members of a family have neuroblastoma, they have germline mutations in the *anaplastic lymphoma kinase* (*ALK*) gene. These mutations can be found in a

blood sample. However, *ALK* mutations have also been found in DNA from tumors in some patients without a family history.

Neuroblastoma has also been diagnosed in several patients who are missing portions of chromosomes 1p and 11q that are thought to prevent tumor growth.

Genetic factors without a family history

The genetic factors that have a role in the development of neuroblastoma in patients who do not have a family history are not well understood. Genome-wide association studies have identified a number of germline SNPs that are highly associated with neuroblastoma. These include SNPs within or upstream of *CASC15*, *FLJ44180*, *BARD1*, *LMO1*, *DUSP12*, *HSD17B12*, *DDX4*/*IL31RA, HACE1, and LIN28B* genes along with a common copy number variation within *NBPF23*.

A recent study has shown that rare germline variants in *TP53* are also associated with neuroblastoma. However, these variants account for only a small portion of the risk for developing neuroblastoma. For more from Cancer.Net, read about the genetics of cancer [4]. Learn more about genetic studies here [5] (please note, this link takes you to an outside website).

To continue reading this guide, use the menu on the side of your screen to select another section.

Links:
[1] http://www.cancer.net/cancer-types/neuroblastoma-childhood/risk-factors
[2] http://www.cancer.net/about-us
[3] http://www.cancer.net/node/19429
[4] http://www.cancer.net/node/24864
[5] http://www.genome.gov/