



NF2 gene

neurofibromin 2

Normal Function

The *NF2* gene provides instructions for the production of a protein called merlin, also known as schwannomin. This protein is made in the nervous system, particularly in specialized cells called Schwann cells that wrap around and insulate nerves.

Merlin helps regulate several key signaling pathways that are important for controlling cell shape, cell growth, and the attachment of cells to one another (cell adhesion). This protein functions as a tumor suppressor, preventing cells from growing and dividing too fast or in an uncontrolled way.

Health Conditions Related to Genetic Changes

Neurofibromatosis type 2

More than 400 mutations in the *NF2* gene have been identified in people with neurofibromatosis type 2, a disorder characterized by the growth of noncancerous (benign) tumors in the nervous system. The most common tumors associated with this condition are bilateral vestibular schwannomas, which develop along the nerves that carry information from the inner ear to the brain (the auditory nerves). These tumors arise from Schwann cells. People with neurofibromatosis type 2 can also develop other nervous system tumors, including meningiomas and ependymomas.

The *NF2* gene mutations that cause neurofibromatosis type 2 are classified as germline, which means they are present in all of the body's cells. Most *NF2* gene mutations result in an abnormally shortened version of the merlin protein. This short protein cannot perform its normal tumor suppressor function in cells. Research suggests that the loss of merlin's function allows certain cells in the nervous system, especially Schwann cells, to multiply too frequently and form tumors.

Schwannomatosis

Noninherited (somatic) mutations in the *NF2* gene have been associated with a disorder called schwannomatosis that is similar to neurofibromatosis type 2 (described above). Schwannomatosis is characterized by the development of multiple schwannomas that grow on nerves throughout the body. People with schwannomatosis usually do not develop bilateral vestibular schwannomas or the other tumors that can occur with neurofibromatosis type 2.

Unlike the germline *NF2* gene mutations that cause neurofibromatosis type 2, the somatic mutations associated with schwannomatosis occur only in the cells that give rise to the tumors. It appears that these somatic *NF2* gene mutations do not cause

schwannomatosis, although they are likely among the genetic factors that contribute to the formation of tumors.

Tumors

Somatic mutations in the *NF2* gene are involved in the development of several additional types of tumors, both benign and cancerous. These mutations trigger cells to grow and divide without control or order, leading to the formation of a tumor.

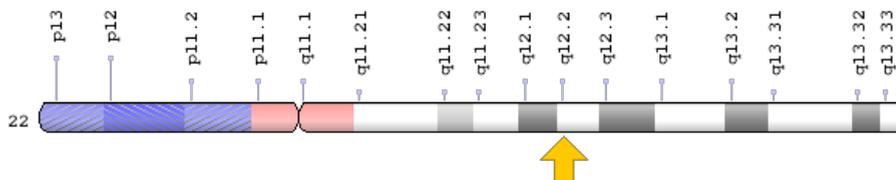
Loss or inactivation of the *NF2* gene is often associated with the development of single (isolated) nervous system tumors, including meningiomas, ependymomas, and schwannomas. While these tumors are part of neurofibromatosis type 2 and schwannomatosis (described above), isolated tumors can develop in people who do not have these disorders. Researchers have determined that loss or inactivation of the *NF2* gene also occurs in many cases of mesothelioma, which is a cancerous tumor that can arise in the lining of the lung and chest cavity (pleura) or the lining of the abdomen (peritoneum).

Somatic *NF2* gene mutations appear to be uncommon in most other forms of cancer. In some cases, *NF2* gene mutations are associated with how quickly a tumor grows or spreads (disease progression) or with the likelihood that a tumor will respond to treatment.

Chromosomal Location

Cytogenetic Location: 22q12.2, which is the long (q) arm of chromosome 22 at position 12.2

Molecular Location: base pairs 29,603,556 to 29,698,600 on chromosome 22 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ACN
- BANF
- MERL_HUMAN
- merlin

- moesin-ezrin-radixin-like protein
- SCH
- schwannomerlin
- schwannomin

Additional Information & Resources

Educational Resources

- Cancer Medicine (sixth edition, 2003): NF1 and NF2 Genes
<https://www.ncbi.nlm.nih.gov/books/NBK12681/>
- National Human Genome Research Institute: The Genomic Services Research Program (GSRP): Study of People with Unexpected Genetic Results
<https://www.genome.gov/Current-NHGRI-Clinical-Studies/Genomic-Services-Research-Program>
- The Cell: A Molecular Approach (second edition, 2000): Tumor Suppressor Genes
<https://www.ncbi.nlm.nih.gov/books/NBK9894/>

Clinical Information from GeneReviews

- Neurofibromatosis 2
<https://www.ncbi.nlm.nih.gov/books/NBK1201>
- Schwannomatosis
<https://www.ncbi.nlm.nih.gov/books/NBK487394>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28neurofibromin+2%5BTIAB%5D%29+OR+%28%28NF2%5BTIAB%5D%29+AND+%28gene%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D>

Catalog of Genes and Diseases from OMIM

- MENINGIOMA, FAMILIAL, SUSCEPTIBILITY TO
<http://omim.org/entry/607174>
- MESOTHELIOMA, MALIGNANT
<http://omim.org/entry/156240>
- NEUROFIBROMIN 2
<http://omim.org/entry/607379>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
<http://atlasgeneticsoncology.org/Genes/NF2ID117.html>
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=NF2%5Bgene%5D>
- HGNC Gene Symbol Report
https://www.genenames.org/data/gene-symbol-report#!/hgnc_id/HGNC:7773
- Monarch Initiative
<https://monarchinitiative.org/gene/NCBIGene:4771>
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/4771>
- UniProt
<https://www.uniprot.org/uniprot/P35240>

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