

NF2 Gene

Subjects: **Genetics & Heredity**

Contributor: Lily Guo

neurofibromin 2

genes

1. Introduction

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.

2. Health Conditions Related to Genetic Changes

2.1. 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.

2.2. 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.

2.3. 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.

3. Other Names for This Gene

- ACN
- BANF
- MERL_HUMAN
- merlin
- moesin-ezrin-radixin-like protein
- SCH

- schwannomerlin
- schwannomin

References

1. Ahronowitz I, Xin W, Kiely R, Sims K, MacCollin M, Nunes FP. Mutational spectrum of the NF2 gene: a meta-analysis of 12 years of research and diagnostic laboratory findings. *Hum Mutat.* 2007 Jan;28(1):1-12.
2. Cooper J, Giancotti FG. Molecular insights into NF2/Merlin tumor suppressor function. *FEBS Lett.* 2014 Aug 19;588(16):2743-52. doi:10.1016/j.febslet.2014.04.001.
3. Hadfield KD, Newman WG, Bowers NL, Wallace A, Bolger C, Colley A, McCann E, Trump D, Prescott T, Evans DG. Molecular characterisation of SMARCB1 and NF2 in familial and sporadic schwannomatosis. *J Med Genet.* 2008 Jun;45(6):332-9. doi:10.1136/jmg.2007.056499.Sep;45(9):608.
4. MacCollin M, Willett C, Heinrich B, Jacoby LB, Acierno JS Jr, Perry A, Louis DN. Familial schwannomatosis: exclusion of the NF2 locus as the germline event. *Neurology.* 2003 Jun 24;60(12):1968-74.
5. Petrilli AM, Fernández-Valle C. Role of Merlin/NF2 inactivation in tumor biology. *Oncogene.* 2016 Feb 4;35(5):537-48. doi: 10.1038/onc.2015.125.
6. Schroeder RD, Angelo LS, Kurzrock R. NF2/merlin in hereditary neurofibromatosis 2 versus cancer: biologic mechanisms and clinical associations. *Oncotarget.* 2014 Jan 15;5(1):67-77. Review.

Retrieved from <https://encyclopedia.pub/entry/history/show/12691>