



NGF gene

nerve growth factor

Normal Function

The *NGF* gene provides instructions for making a protein called nerve growth factor beta (NGF β). This protein is important in the development and survival of nerve cells (neurons), especially those that transmit pain, temperature, and touch sensations (sensory neurons). The NGF β protein functions by attaching (binding) to its receptors, which initiates signaling pathways inside the cell. The NGF β protein can bind to two different receptors, the NTRK1 receptor or the p75^{NTR} receptor. Both receptors are found on the surface of sensory neurons and other types of neurons. The binding of the NGF β protein to the NTRK1 receptor signals these neurons to grow and to mature and take on specialized functions (differentiate). This binding also blocks signals that initiate the process of self-destruction (apoptosis). Additionally, NGF β signaling through NTRK1 plays a role in pain sensation. It is less clear what binding with the p75^{NTR} receptor signals. Studies suggest that p75^{NTR} signaling can help sensory neurons grow and differentiate but can also trigger apoptosis.

Health Conditions Related to Genetic Changes

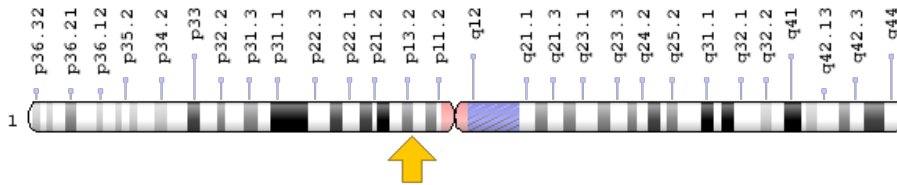
Hereditary sensory and autonomic neuropathy type V

At least one mutation in the *NGF* gene has been reported to cause hereditary sensory and autonomic neuropathy type V (HSAN5), a condition characterized by the inability to feel pain and sense hot and cold. This mutation changes a single protein building block (amino acid) in the NGF β protein. The amino acid arginine is replaced with the amino acid tryptophan at position 100 (written as Arg100Trp or R100W). Studies show that the mutated NGF β protein cannot bind to the p75^{NTR} receptor and that it alters the signaling through the NTRK1 receptor. In addition, people with HSAN5 have a reduced number of sensory neurons. However, the mechanism by which mutation of the *NGF* gene leads to the inability to feel pain and temperature sensations is unclear. Although the NGF β protein is important in many types of neurons, only sensory neurons appear to be affected in people with HSAN5.

Chromosomal Location

Cytogenetic Location: 1p13.2, which is the short (p) arm of chromosome 1 at position 13.2

Molecular Location: base pairs 115,285,915 to 115,338,253 on chromosome 1 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- beta-nerve growth factor
- beta-nerve growth factor precursor
- Beta-NGF
- HSN5
- nerve growth factor (beta polypeptide)
- nerve growth factor, beta subunit
- NGF_HUMAN
- NGFB

Additional Information & Resources

Educational Resources

- Molecular Cell Biology (Fourth Edition, 2000): Neurotrophins Promote Survival of Neurons
<https://www.ncbi.nlm.nih.gov/books/NBK21716/#A6893>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28NGF%5BTI%5D%29+OR+%28nerve+growth+factor%5BTI%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D>

OMIM

- NERVE GROWTH FACTOR
<http://omim.org/entry/162030>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_NGF.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=NGF%5Bgene%5D>
- HGNC Gene Family: Neurotrophins
<https://www.genenames.org/cgi-bin/genefamilies/set/1585>
- HGNC Gene Symbol Report
https://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=7808
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/4803>
- UniProt
<http://www.uniprot.org/uniprot/P01138>

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