

## NGF gene

nerve growth factor

### Normal Function

The *NGF* gene provides instructions for making a protein called nerve growth factor beta (NGF $\beta$ ). 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 $\beta$  protein functions by attaching (binding) to its receptors, which initiates signaling pathways inside the cell. The NGF $\beta$  protein can bind to two different receptors, the NTRK1 receptor or the p75<sup>NTR</sup> receptor. Both receptors are found on the surface of sensory neurons and other types of neurons. The binding of the NGF $\beta$  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 $\beta$  signaling through NTRK1 plays a role in pain sensation. It is less clear what binding with the p75<sup>NTR</sup> receptor signals. Studies suggest that p75<sup>NTR</sup> 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 $\beta$  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 $\beta$  protein cannot bind to the p75<sup>NTR</sup> 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 $\beta$  protein is important in many types of neurons, only sensory neurons appear to be affected in people with HSAN5.

### 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**

### Tests Listed in the Genetic Testing Registry

- Tests of NGF ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4803\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4803[geneid]))

### Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?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%29%29%29>)

### Catalog of Genes and Diseases from OMIM

- NERVE GROWTH FACTOR; NGF (<https://omim.org/entry/162030>)

### Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/4803>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=NGF\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=NGF[gene]))

## **References**

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## Genomic Location

The *NGF* gene is found on chromosome 1 (<https://medlineplus.gov/genetics/chromosome/1/>).

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