RETREG1 gene

reticulophagy regulator 1

Normal Function

The *RETREG1* gene provides instructions for making a protein that is involved in a cellular process called autophagy. Cells use this process to recycle worn-out or unnecessary cell parts and break down certain proteins when they are no longer needed. In particular, the RETREG1 protein helps direct autophagy of a cell structure called the endoplasmic reticulum, which is important in protein processing and transport. Autophagy may be a way for the cell to remove parts of the endoplasmic reticulum when they are no longer needed or to break down excess or abnormal proteins that are being processed within the structure.

The RETREG1 protein also appears to be important in the organization of another cell structure called the Golgi apparatus, which is important for distribution of proteins within the cell.

The RETREG1 protein is found in sensory and autonomic nerve cells (neurons). Sensory neurons transmit pain, touch, and temperature sensations. Autonomic neurons help control involuntary functions of the body such as heart rate and blood pressure.

Health Conditions Related to Genetic Changes

Hereditary sensory and autonomic neuropathy type II

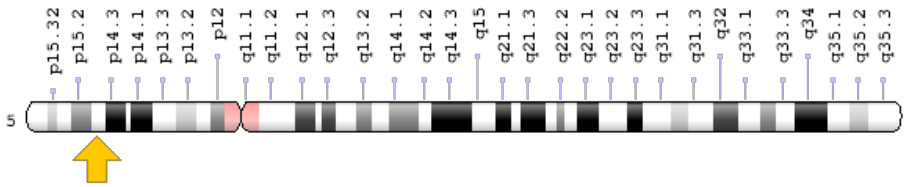
Mutations in the *RETREG1* gene are responsible for one type of hereditary sensory and autonomic neuropathy type II (HSAN2) called HSAN2B; at least five mutations have been identified in affected individuals. People with HSAN2B lose the ability to feel pain or sense hot and cold. The *RETREG1* gene mutations may lead to an abnormally short and nonfunctional protein. The resulting lack of functioning RETREG1 protein impairs autophagy of the endoplasmic reticulum and alters the structure of the Golgi apparatus in sensory and autonomic neurons.

Researchers suspect that an inability to break down parts of the endoplasmic reticulum when they are no longer needed, and the subsequent accumulation of these structures and other proteins in cells, leads to cell death. The loss of sensory and autonomic neurons due to impaired autophagy results in the signs and symptoms of HSAN2B. It is unclear what role abnormalities of the Golgi apparatus play in the condition.

Chromosomal Location

Cytogenetic Location: 5p15.1, which is the short (p) arm of chromosome 5 at position 15.1

Molecular Location: base pairs 16,473,038 to 16,617,096 on chromosome 5 (Homo sapiens Updated Annotation Release 109.20190607, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- F134B_HUMAN
- FAM134B
- FAM134B protein
- FAM134B protein isoform 1
- FAM134B protein isoform 2
- family with sequence similarity 134 member B
- family with sequence similarity 134, member B
- FLJ20152
- FLJ22155
- FLJ22179
- JK1

Additional Information & Resources

Educational Resources

- Madame Curie Bioscience Database (2000): Macroautophagy in Mammalian Cells https://www.ncbi.nlm.nih.gov/books/NBK6211/

Clinical Information from GeneReviews

- Hereditary Sensory and Autonomic Neuropathy Type II https://www.ncbi.nlm.nih.gov/books/NBK49247

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28FAM134B%5BTIAB%5D%29+OR+%28JK1%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- FAMILY WITH SEQUENCE SIMILARITY 134, MEMBER B
  http://omim.org/entry/613114

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_RETREG1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=RETREG1%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:25964
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:54463
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/54463
- UniProt
  https://www.uniprot.org/uniprot/Q9H6L5

Sources for This Summary

- OMIM: FAMILY WITH SEQUENCE SIMILARITY 134, MEMBER B
  http://omim.org/entry/613114
- Khaminets A, Heinrich T, Mari M, Grumati P, Huebner AK, Akutsu M, Liebmann L, Stolz A, Nietzsche S, Koch N, Mauthe M, Katona I, Qualmann B, Weis J, Reggiori F, Kurth I, Hübner CA, Dikic I. Regulation of endoplasmic reticulum turnover by selective autophagy. Nature. 2015 Jun 18; 522(7556):354-8. doi: 10.1038/nature14498. Epub 2015 Jun 3.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/26040720
- Kurth I, Pamminger T, Hennings JC, Soehendra D, Huebner AK, Rotthier A, Baets J, Senderek J, Topaloglu H, Farrell SA, Nürnberg G, Nürnberg P, De Jonghe P, Gal A, Kaether C, Timmerman V, Hübner CA. Mutations in FAM134B, encoding a newly identified Golgi protein, cause severe sensory and autonomic neuropathy. Nat Genet. 2009 Nov;41(11):1179-81. doi: 10.1038/ng.464. Epub 2009 Oct 18.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/19838196
- Mochida K, Oikawa Y, Kimura Y, Kirisako H, Hirano H, Ohsumi Y, Nakatogawa H. Receptor-mediated selective autophagy degrades the endoplasmic reticulum and the nucleus. Nature. 2015 Jun 18;522(7556):359-62. doi: 10.1038/nature14506. Epub 2015 Jun 3.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/26040717

- Murphy SM, Davidson GL, Brandner S, Houlden H, Reilly MM. Mutation in FAM134B causing severe hereditary sensory neuropathy. J Neurol Neurosurg Psychiatry. 2012 Jan;83(1):119-20. doi: 10.1136/jnnp.2010.228965. Epub 2010 Nov 28.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/21115472
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3721196/
- Verpoorten N, De Jonghe P, Timmerman V. Disease mechanisms in hereditary sensory and autonomic neuropathies. Neurobiol Dis. 2006 Feb;21(2):247-55. Epub 2005 Sep 23. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16183296

Reprinted from Genetics Home Reference:
https://ghr.nlm.nih.gov/gene/RETREG1

Reviewed: April 2017
Published: September 10, 2019

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services