SPTLC1 gene

serine palmitoyltransferase long chain base subunit 1

Normal Function

The *SPTLC1* gene provides instructions for making one part (subunit) of an enzyme called serine palmitoyltransferase (SPT). The SPT enzyme is involved in making certain fats called sphingolipids. Sphingolipids are important components of cell membranes that play a role in many cell functions. The SPT enzyme initiates the first step of sphingolipid production, in which the molecules serine and palmitoyl CoA combine to form a molecule called ketodihydrosphingosine. Additional chemical reactions convert ketodihydrosphingosine into various types of sphingolipids. Within the cell, the SPT enzyme is mainly found on the endoplasmic reticulum, which is a structure involved in protein processing and transport.

Health Conditions Related to Genetic Changes

Hereditary sensory neuropathy type IA

At least nine mutations in the *SPTLC1* gene have been found to cause hereditary sensory neuropathy type IA. This condition is characterized by nerve abnormalities in the legs and feet (peripheral neuropathy); a reduced ability to feel pain, which can lead to the development of open sores; and muscle weakness that can impair mobility. The *SPTLC1* gene mutations change single protein building blocks (amino acids) in the SPTLC1 subunit. One mutation that has been found in multiple affected families worldwide replaces the amino acid cysteine with the amino acid tryptophan at position 133 in the SPTLC1 subunit (written as Cys133Trp or C133W).

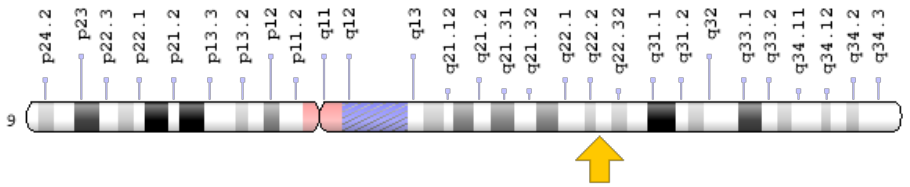
SPTLC1 gene mutations reduce the amount of functional SPTLC1 subunit that is produced, which results in an SPT enzyme with altered activity. This altered enzyme makes molecules called deoxysphingoid bases, which it does not normally produce. Because of this new function, the SPT enzyme's production of sphingolipid is reduced. Overall, there does not seem to be a decrease in sphingolipid production because the body is able to compensate for the SPT enzyme's reduced production. When accumulated, deoxysphingoid bases are toxic to neurons. The gradual destruction of nerve cells caused by the buildup of toxic molecules results in loss of sensation and muscle weakness in people with hereditary sensory neuropathy type IA.

Charcot-Marie-Tooth disease

Chromosomal Location

Cytogenetic Location: 9q22.31, which is the long (q) arm of chromosome 9 at position 22.31

Molecular Location: base pairs 92,031,141 to 92,115,413 on chromosome 9 (Homo sapiens Updated Annotation Release 109.20190607, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- hLCB1
- LBC1
- LCB1
- long chain base biosynthesis protein 1
- serine C-palmitoyltransferase
- serine-palmitoyl-CoA transferase 1
- serine palmitoyltransferase subunit 1
- serine palmitoyltransferase, long chain base subunit 1
- SPT1
- SPTC1_HUMAN
- SPTI

Additional Information & Resources

Clinical Information from GeneReviews

- SPTLC1-Related Hereditary Sensory Neuropathy
  https://www.ncbi.nlm.nih.gov/books/NBK1390

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28SPTLC1%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

- SERINE PALMITOYLTRANSFERASE, LONG-CHAIN BASE SUBUNIT 1
  http://omim.org/entry/605712

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_SPTLC1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=SPTLC1%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:11277
- Inherited Peripheral Neuropathies Mutation Database: Mutations in SPTLC1
  http://www.molgen.ua.ac.be/CMTMutations/Mutations/Mutations.cfm?Context=13
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:10558
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/10558
- UniProt
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