

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

MedlinePlus Genetics provides information about Charcot-Marie-Tooth disease

Other Names for This Gene

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

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of SPTLC1 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=10558\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=10558[geneid]))

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?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; SPTLC1 (<https://omim.org/entry/605712>)

Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/10558>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=SPTLC1\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=SPTLC1[gene]))

References

- Auer-Grumbach M, Bode H, Pieber TR, Schabhuttl M, Fischer D, Seidl R, Graf E, Wieland T, Schuh R, Vacariu G, Grill F, Timmerman V, Strom TM, Hornemann T. Mutations at Ser331 in the HSN type I gene SPTLC1 are associated with a distinct syndromic phenotype. *Eur J Med Genet.* 2013 May;56(5):266-9. doi:10.1016/j.ejmg.2013.02.002. Epub 2013 Feb 27. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23454272>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3682180/>)
- Bejaoui K, Wu C, Scheffler MD, Haan G, Ashby P, Wu L, de Jong P, Brown RH Jr. SPTLC1 is mutated in hereditary sensory neuropathy, type 1. *Nat Genet.* 2001 Mar; 27(3):261-2. doi: 10.1038/85817. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/11242106>)
- Dawkins JL, Hulme DJ, Brahmabhatt SB, Auer-Grumbach M, Nicholson GA. Mutations in SPTLC1, encoding serine palmitoyltransferase, long chain base subunit-1, cause hereditary sensory neuropathy type I. *Nat Genet.* 2001 Mar;27(3):309-12. doi:10.1038/85879. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/11242114>)
- Hornemann T, Richard S, Rutti MF, Wei Y, von Eckardstein A. Cloning and initial characterization of a new subunit for mammalian serine-palmitoyltransferase. *J Biol Chem.* 2006 Dec 8;281(49):37275-81. doi:10.1074/jbc.M608066200. Epub 2006 Oct 4. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/17023427>)
- Houlden H, King R, Blake J, Groves M, Love S, Woodward C, Hammans S, Nicoll J, Lennox G, O'Donovan DG, Gabriel C, Thomas PK, Reilly MM. Clinical, pathological and genetic characterization of hereditary sensory and autonomic neuropathy type 1 (HSAN I). *Brain.* 2006 Feb;129(Pt 2):411-25. doi: 10.1093/brain/awh712. Epub 2005 Dec 19. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/16364956>)
- Penno A, Reilly MM, Houlden H, Laura M, Rentsch K, Niederkofer V, Stoeckli ET, Nicholson G, Eichler F, Brown RH Jr, von Eckardstein A, Hornemann T. Hereditary sensory neuropathy type 1 is caused by the accumulation of two neurotoxic sphingolipids. *J Biol Chem.* 2010 Apr 9;285(15):11178-87. doi:10.1074/jbc.M109.092973. Epub 2010 Jan 22. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/20097765>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2856995/>)
- Rotthier A, Penno A, Rautenstrauss B, Auer-Grumbach M, Stettner GM, Asselbergh B, Van Hoof K, Sticht H, Levy N, Timmerman V, Hornemann T, Janssens K. Characterization of two mutations in the SPTLC1 subunit of serine palmitoyltransferase associated with hereditary sensory and autonomic neuropathy type I. *Hum Mutat.* 2011 Jun;32(6):E2211-25. doi: 10.1002/humu.21481. Epub 2011 Feb 24. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/21618344>)
- Wei J, Yerokun T, Leipelt M, Haynes CA, Radhakrishna H, Momin A, Kelly S, Park H, Wang E, Carton JM, Uhlinger DJ, Merrill AH Jr. Serine palmitoyltransferase subunit 1 is present in the endoplasmic reticulum, nucleus and focal adhesions, and functions in cell morphology. *Biochim Biophys Acta.* 2009 Aug;1791(8):746-56. doi: 10.1016/j.bbali.2009.03.016. Epub 2009 Apr 9. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/19030166>)

d.ncbi.nlm.nih.gov/19362163) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2801055/>)

Genomic Location

The *SPTLC1* gene is found on chromosome 9 (<https://medlineplus.gov/genetics/chromosome/9/>).

Last updated March 1, 2015