CCBE1 gene

collagen and calcium binding EGF domains 1

Normal Function

The *CCBE1* gene provides instructions for making a protein that is found in the lattice of proteins and other molecules outside the cell (extracellular matrix). The CCBE1 protein is involved in the formation of the lymphatic system, which consists of a network of vessels that transport lymph fluid and immune cells throughout the body. Specifically, the CCBE1 protein helps guide maturation (differentiation) and movement (migration) of immature cells called lymphangioblasts that will eventually form the lining (epithelium) of lymphatic vessels.

Health Conditions Related to Genetic Changes

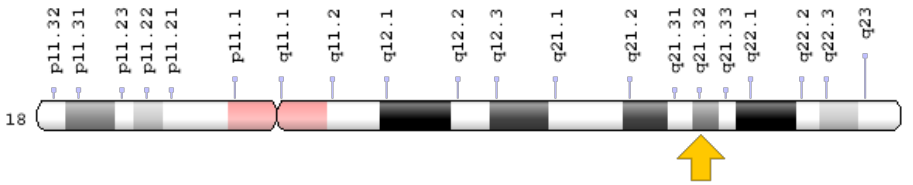
Hennekam syndrome

At least 13 mutations in the *CCBE1* gene have been found to cause Hennekam syndrome, an inherited disorder resulting from malformation of the lymphatic system. Most *CCBE1* gene mutations change single protein building blocks (amino acids) in the CCBE1 protein leading to a change in the three-dimensional shape of the protein. The abnormal protein cannot play its role in the formation of the lymphatic vessel epithelium. A poorly formed lymphatic system leads to lymphatic vessels that are abnormally expanded (lymphangiectasia) and are prone to break open (rupture), puffiness or swelling caused by a buildup of fluid (lymphedema), and other features of Hennekam syndrome. *CCBE1* gene mutations account for about 25 percent of all cases of Hennekam syndrome.

Chromosomal Location

Cytogenetic Location: 18q21.32, which is the long (q) arm of chromosome 18 at position 21.32

Molecular Location: base pairs 59,430,939 to 59,698,181 on chromosome 18 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- collagen and calcium-binding EGF domain-containing protein 1
- FLJ30681
- full of fluid protein homolog
- KIAA1983

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): Human Lymphoid Organs (figure)
  https://www.ncbi.nlm.nih.gov/books/NBK26921/figure/A4423/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28CCBE1%5BTIAB%5D%29+OR+%28EGF+domains+1%5BTIAB%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+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- COLLAGEN AND CALCIUM-BINDING EGF DOMAIN-CONTAINING PROTEIN 1
  http://omim.org/entry/612753

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_CCBE1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=CCBE1%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:29426
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:147372
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/147372
- UniProt
  https://www.uniprot.org/uniprot/Q6UXH8

Sources for This Summary

- Alders M, Hogan BM, Gjini E, Salehi F, Al-Gazali L, Hennekam EA, Holmberg EE, Mannens MM, Mulder MF, Offerhaus GJ, Prescott TE, Schroor EJ, Verheij JB, Witte M, Zwijnenburg PJ, Vikkula M, Schulte-Merker S, Hennekam RC. Mutations in CCBE1 cause generalized lymph vessel dysplasia in humans. Nat Genet. 2009 Dec;41(12):1272-4. doi: 10.1038/ng.484.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/19935664
- Bos FL, Caunt M, Peterson-Maduro J, Planas-Paz L, Kowalski J, Karpanen T, van Impel A, Tong R, Ernst JA, Korving J, van Es JH, Lammert E, Duckers HJ, Schulte-Merker S. CCBE1 is essential for mammalian lymphatic vascular development and enhances the lymphangiogenic effect of vascular endothelial growth factor-C in vivo. Circ Res. 2011 Aug 19;109(5):486-91. doi: 10.1161/CIRCRESAHA.111.250738. Epub 2011 Jul 21.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/21778431
- OMIM: COLLAGEN AND CALCIUM-BINDING EGF DOMAIN-CONTAINING PROTEIN 1
  http://omim.org/entry/612753
- Connell F, Kalidas K, Ostergaard P, Brice G, Homfray T, Roberts L, Bunyan DJ, Mitton S, Mansour S, Mortimer P, Jeffery S; Lymphoedema Consortium. Linkage and sequence analysis indicate that CCBE1 is mutated in recessively inherited generalised lymphatic dysplasia. Hum Genet. 2010 Feb;127(2):231-41. doi: 10.1007/s00439-009-0766-y. Epub 2009 Nov 13. Erratum in: Hum Genet. 2010 Feb;127(2):243.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/19911200

Reprinted from Genetics Home Reference:
https://ghr.nlm.nih.gov/gene/CCBE1

Reviewed: July 2014
Published: May 14, 2019

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