



KLKB1 gene

kallikrein B1

Normal Function

The *KLKB1* gene provides instructions for making a protein called prekallikrein. Prekallikrein is produced in the liver and circulates in the blood. A molecule called factor XII converts prekallikrein to another protein called plasma kallikrein, and plasma kallikrein helps turn on (activate) more factor XII. Plasma kallikrein and factor XII are involved in the early stages of blood clotting as part of a process called the intrinsic coagulation pathway (also called the contact activation pathway). Blood clots protect the body after an injury by sealing off damaged blood vessels and preventing further blood loss.

The interaction between plasma kallikrein and factor XII also initiates a series of chemical reactions resulting in the release of a protein called bradykinin. Bradykinin promotes inflammation by increasing the permeability of blood vessel walls, allowing more fluids to leak into body tissues. This leakage causes the swelling that accompanies inflammation.

Health Conditions Related to Genetic Changes

Prekallikrein deficiency

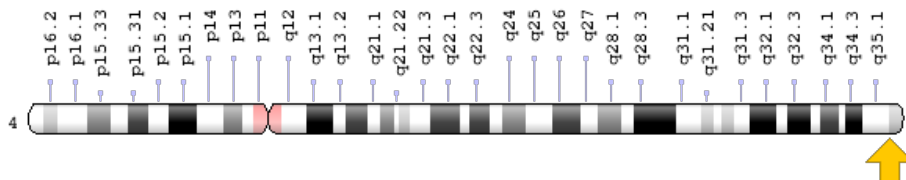
At least nine *KLKB1* gene mutations have been identified in people with a blood condition called prekallikrein deficiency, which does not generally cause any health problems. The condition is usually discovered when blood tests are done for other reasons.

The *KLKB1* gene mutations that cause this condition reduce or eliminate functional plasma kallikrein in the blood of affected individuals and likely impair the intrinsic coagulation pathway. Researchers suggest that this lack (deficiency) of functional plasma kallikrein protein does not generally cause any symptoms because another process called the extrinsic coagulation pathway (also known as the tissue factor pathway) can compensate for the impaired intrinsic coagulation pathway. Either pathway can activate proteins that are needed later in the clotting process.

Chromosomal Location

Cytogenetic Location: 4q35.2, which is the long (q) arm of chromosome 4 at position 35.2

Molecular Location: base pairs 186,215,714 to 186,258,477 on chromosome 4 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- Fletcher factor
- kallikrein B, plasma (Fletcher factor) 1
- kininogenin
- plasma kallikrein
- plasma kallikrein preproprotein
- plasma prekallikrein
- PPK

Additional Information & Resources

Educational Resources

- Biochemistry (fifth edition, 2002): Blood Clotting Cascade
<https://www.ncbi.nlm.nih.gov/books/NBK22589/?rendertype=figure&id=A1401>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28KLKB1%5BTIAB%5D%29+OR+%28%28PPK%5BTIAB%5D%29+OR+%28plasma+kallikrein%5BTIAB%5D%29+OR+%28kininogenin%5BTIAB%5D%29+OR+%28Fletcher+factor%5BTIAB%5D%29+OR+%28plasma+prekallikrein%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+720+days%22%5Bdp%5D>

Catalog of Genes and Diseases from OMIM

- KALLIKREIN B, PLASMA, 1
<http://omim.org/entry/229000>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_KLKB1.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=KLKB1%5Bgene%5D>
- HGNC Gene Symbol Report
https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:6371
- Monarch Initiative
<https://monarchinitiative.org/gene/NCBIGene:3818>
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/3818>
- UniProt
<https://www.uniprot.org/uniprot/P03952>

Sources for This Summary

- Björkqvist J, Jämsä A, Renné T. Plasma kallikrein: the bradykinin-producing enzyme. *Thromb Haemost.* 2013 Sep;110(3):399-407. doi: 10.1160/TH13-03-0258. Epub 2013 Jul 11. Review. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/23846131>
- Feener EP, Zhou Q, Fickweiler W. Role of plasma kallikrein in diabetes and metabolism. *Thromb Haemost.* 2013 Sep;110(3):434-41. doi: 10.1160/TH13-02-0179. Epub 2013 May 16. Review. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/23676986>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3757113/>
- François D, Trigui N, Leterreux G, Flaujac C, Horellou MH, Mazaux L, Vignon D, Conard J, de Mazancourt P. Severe prekallikrein deficiencies due to homozygous C529Y mutations. *Blood Coagul Fibrinolysis.* 2007 Apr;18(3):283-6. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/17413767>
- Girolami A, Scarparo P, Candeo N, Lombardi AM. Congenital prekallikrein deficiency. *Expert Rev Hematol.* 2010 Dec;3(6):685-95. doi: 10.1586/ehm.10.69. Review. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/21091145>
- OMIM: KALLIKREIN B, PLASMA, 1
<http://omim.org/entry/229000>
- Lombardi AM, Sartori MT, Cabrio L, Fadin M, Zanon E, Girolami A. Severe prekallikrein (Fletcher factor) deficiency due to a compound heterozygosis (383Trp stop codon and Cys529Tyr). *Thromb Haemost.* 2003 Dec;90(6):1040-5. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/14652634>
- Nakao T, Yamane T, Katagami T, Shiota M, Izumi Y, Samori T, Hino M, Iwao H. Severe prekallikrein deficiency due to a homozygous Trp499Stop nonsense mutation. *Blood Coagul Fibrinolysis.* 2011 Jun;22(4):337-9. doi: 10.1097/MBC.0b013e3283444ddb. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/21415712>

- Schmaier AH, McCrae KR. The plasma kallikrein-kinin system: its evolution from contact activation. *J Thromb Haemost.* 2007 Dec;5(12):2323-9. Epub 2007 Sep 19. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/17883591>
 - Wynne Jones D, Russell G, Allford SL, Burdon K, Hawkins GA, Bowden DW, Minaee S, Mumford AD. Severe prekallikrein deficiency associated with homozygosity for an Arg94Stop nonsense mutation. *Br J Haematol.* 2004 Oct;127(2):220-3.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15461630>
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<https://ghr.nlm.nih.gov/gene/KLKB1>

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