F10 gene
coagulation factor X

Normal Function

The $F10$ gene provides instructions for making a protein called coagulation factor X. Coagulation factors are a group of related proteins that are involved in the coagulation system, which is a series of chemical reactions that form blood clots. After an injury, clots seal off blood vessels to stop bleeding and trigger blood vessel repair.

Coagulation factor X is made primarily by cells in the liver. The protein circulates in the bloodstream in an inactive form until the coagulation system is turned on (activated) by an injury that damages blood vessels. When coagulation factor X is activated, it interacts with other coagulation factors to convert an important coagulation protein called prothrombin to its active form, thrombin. Thrombin then converts a protein called fibrinogen into fibrin, which is the material that forms blood clots.

Health Conditions Related to Genetic Changes

Factor X deficiency

At least 130 mutations in the $F10$ gene have been found to cause a rare bleeding disorder called factor X deficiency. This disorder commonly causes nosebleeds, easy bruising, bleeding under the skin, bleeding of the gums, blood in the urine (hematuria), and prolonged or excessive bleeding following surgery or trauma. Some $F10$ gene mutations that cause factor X deficiency reduce the amount of coagulation factor X in the bloodstream, resulting in a form of the disorder called type I. Other $F10$ gene mutations result in the production of a coagulation factor X protein with impaired function, leading to type II factor X deficiency. Reduced quantity or function of coagulation factor X prevents blood from clotting normally, causing episodes of abnormal bleeding that can be severe.
Chromosomal Location

Cytogenetic Location: 13q34, which is the long (q) arm of chromosome 13 at position 34.

Molecular Location: base pairs 113,122,799 to 113,149,529 on chromosome 13 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)

Other Names for This Gene

• autoprothrombin III
• prothrombinase
• Prower factor
• Stuart factor
• Stuart-Prower factor

Additional Information & Resources

Educational Resources

• Biochemistry (fifth edition, 2002): Blood-Clotting Cascade (image)
  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=%28coagulation+factor+X%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+1080+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

• COAGULATION FACTOR X
  http://omim.org/entry/613872
Research Resources

• Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_F10.html

• ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=F10%5Bgene%5D

• HGNC Gene Symbol Report

• Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:2159

• NCBI Gene

• UniProt
  https://www.uniprot.org/uniprot/P00742

Sources for This Summary

• Brown DL, Kouides PA. Diagnosis and treatment of inherited factor X deficiency. Haemophilia. 2008
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/19141158

• OMIM: COAGULATION FACTOR X
  http://omim.org/entry/613872

• Girolami A, Scarparo P, Scandellari R, Allemand E. Congenital factor X deficiencies with a defect
  only or predominantly in the extrinsic or in the intrinsic system: a critical evaluation. Am J Hematol.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18506702

• Girolami A, Vettore S, Scarparo P, Lombardi AM. Persistent validity of a classification of congenital
  factor X defects based on clotting, chromogenic and immunological assays even in the molecular
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20546029

  K; Greifswald Factor X Deficiency Study Group. Factor X deficiency: clinical manifestation of 102
  subjects from Europe and Latin America with mutations in the factor 10 gene. Haemophilia. 2006
  Sep;12(5):479-89.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16919077

• Karimi M, Menegatti M, Afrasiabi A, Sarikhani S, Peyvandi F. Phenotype and genotype report on
  homozygous and heterozygous patients with congenital factor X deficiency. Haematologica. 2008
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18403394

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/19598069

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12127953