F12 gene

coagulation factor XII

Normal Function

The *F12* gene provides instructions for making a protein called coagulation factor XII. Coagulation factors are a group of related proteins that are essential for normal blood clotting (coagulation). After an injury, clots protect the body by sealing off damaged blood vessels and preventing further blood loss. Factor XII circulates in the bloodstream in an inactive form until it is activated, usually by coming in contact with damaged blood vessel walls. Upon activation, factor XII interacts with coagulation factor XI. This interaction sets off a chain of additional chemical reactions that form a blood clot.

Factor XII also plays a role in stimulating inflammation, a normal body response to infection, irritation, or injury. When factor XII is activated, it also interacts with a protein called plasma kallikrein. This interaction initiates a series of chemical reactions that lead to the release of a protein fragment (peptide) called bradykinin. Bradykinin promotes inflammation by allowing fluids to leak through the blood vessel walls into body tissues (vascular permeability). This leakage causes the swelling that accompanies inflammation.

Health Conditions Related to Genetic Changes

Hereditary angioedema

A few variants (also called mutations) in the *F12* gene have been found to cause hereditary angioedema, which is a disorder characterized by recurrent episodes of severe swelling (angioedema). These variants cause a specific form of the condition known as hereditary angioedema with normal C1-INH. The variants change single protein building blocks (amino acids) in factor XII, which leads to the production of a protein that is more easily activated than normal. As a result, more bradykinin is released, increases in the amount of fluids that leak through blood vessel walls. The accumulation of fluids in body tissues leads to the episodes of swelling in people with hereditary angioedema with normal C1-INH.

Other disorders

Variants in the *F12* gene can also cause a disorder known as factor XII deficiency. Factor XII deficiency is an inherited condition characterized by a shortage of factor XII in

the blood. Individuals with this condition usually do not experience abnormal bleeding or other symptoms. Factor XII deficiency is typically discovered during routine blood testing because reduced levels of factor XII cause the blood to take longer to clot in a test tube. Most of the variants that cause factor XII deficiency change single amino acids, which alters the structure of factor XII. It remains unclear why individuals with factor XII deficiency do not experience abnormal bleeding like those with deficiencies of other coagulation factors.

Other Names for This Gene

- coagulation factor XII (Hageman factor)
- FA12_HUMAN
- HAE3
- HAEX
- HAF
- Hageman factor

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of F12 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=2161[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28factor+XII%5BTIAB%5D%29+OR+%28coagulation+factor+XII%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+1440+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- COAGULATION FACTOR XII; F12 (https://omim.org/entry/610619)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/2161)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=F12[gene])

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Genomic Location

The *F12* gene is found on chromosome 5 (https://medlineplus.gov/genetics/chromosome/5/).

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