Prothrombin deficiency

Prothrombin deficiency is a bleeding disorder that slows the blood clotting process. People with this condition often experience prolonged bleeding following an injury, surgery, or having a tooth pulled. In severe cases of prothrombin deficiency, heavy bleeding occurs after minor trauma or even in the absence of injury (spontaneous bleeding). Women with prothrombin deficiency can have prolonged and sometimes abnormally heavy menstrual bleeding. Serious complications can result from bleeding into the joints, muscles, brain, or other internal organs. Milder forms of prothrombin deficiency do not involve spontaneous bleeding, and the condition may only become apparent following surgery or a serious injury.

Frequency

Prothrombin deficiency is very rare; it is estimated to affect 1 in 2 million people in the general population.

Causes

Mutations in the $F2$ gene cause prothrombin deficiency. The $F2$ gene provides instructions for making the prothrombin protein (also called coagulation factor II), which plays a critical role in the formation of blood clots in response to injury. Prothrombin is the precursor to thrombin, a protein that initiates a series of chemical reactions to form a blood clot. After an injury, clots protect the body by sealing off damaged blood vessels and preventing further blood loss.

$F2$ gene mutations reduce the production of prothrombin in cells, which prevents clots from forming properly in response to injury. Problems with blood clotting can lead to excessive bleeding. Some mutations drastically reduce the activity of prothrombin and can lead to severe bleeding episodes. Other $F2$ gene mutations allow for a moderate amount of prothrombin activity, typically resulting in mild bleeding episodes.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.
Other Names for This Condition
- dysprothrombinemia
- factor II deficiency
- hypoprothrombinemia

Diagnosis & Management

Genetic Testing Information
- What is genetic testing? /primer/testing/genetictesting
- Genetic Testing Registry: Prothrombin deficiency, congenital

Research Studies from ClinicalTrials.gov
- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22prothrombin+deficiency%22+OR+%22Hypoprothrombinemias%22+OR+%22factor+II+deficiency%22

Other Diagnosis and Management Resources
- MedlinePlus Encyclopedia: Factor II deficiency
  https://medlineplus.gov/ency/article/000549.htm

Additional Information & Resources

Health Information from MedlinePlus
- Encyclopedia: Factor II deficiency
  https://medlineplus.gov/ency/article/000549.htm
- Health Topic: Bleeding Disorders
  https://medlineplus.gov/bleedingdisorders.html

Genetic and Rare Diseases Information Center
- Prothrombin deficiency
  https://rarediseases.info.nih.gov/diseases/2926/prothrombin-deficiency

Educational Resources
- MalaCards: prothrombin deficiency
  https://www.malacards.org/card/prothrombin_deficiency
  https://www.merckmanuals.com/home/blood-disorders/blood-clotting-process/how-blood-clots
• Orphanet: Congenital factor II deficiency
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=325

• University of Iowa Health Care: Prothrombin Gene Mutation
  https://www.healthcare.uiowa.edu/labs/lentz/Information_For_Patients/PDF/
  Prothrombin%20Gene%20Mutation%20Brochure.pdf

Patient Support and Advocacy Resources

• Canadian Hemophilia Society
  https://www.hemophilia.ca/factor-ii-deficiency-prothrombin-deficiency/

• National Hemophilia Foundation: Factor II Deficiency
  https://www.hemophilia.org/Bleeding-Disorders/Types-of-Bleeding-Disorders/Other-
  Factor-Deficiencies/Factor-II

Scientific Articles on PubMed

• PubMed
  %5BTIAB%5D%29+OR+%28factor+II+deficiency%5BTIAB%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

• PROTHROMBIN DEFICIENCY, CONGENITAL
  http://omim.org/entry/613679

Medical Genetics Database from MedGen

• Prothrombin deficiency, congenital

Sources for This Summary

• Akhavan S, Mannucci PM, Lak M, Mancuso G, Mazzuconi MG, Rocino A, Jenkins PV, Perkins
  SJ. Identification and three-dimensional structural analysis of nine novel mutations in patients with
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11154146

• Jayandharan G, Viswabandya A, Baidya S, Nair SC, Shaji RV, Chandy M, Srivastava A. Molecular
  genetics of hereditary prothrombin deficiency in Indian patients: identification of a novel Ala362 -->
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15892853


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