

Vitamin K Deficiency

Vitamin K deficiency manifests with bleeding. Clinical findings include neonatal hemorrhage and an increased PT and aPTT. Causes of vitamin K deficiency include liver disease, chronic antibiotic use, vitamin K antagonists, malabsorption, and dietary deficiencies. It can be diagnosed by the presence of normal bleeding time and increased PT and PTT. Considerations include neonatal vitamin K injections.



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Clinical Features

Bleeding

Bleeding

Vitamin K contributes to the synthesis of several proteins used in coagulation, including factors II, VII, IX, and X. It works as a cofactor in the carboxylation of glutamic acid residues on prothrombin complex proteins. The deficiency of this vitamin will manifest with mucocutaneous bruising or bleeding.

Neonatal Hemorrhage with Increased PT and aPTT

Neon-baby hit by Hemorrhage-hammer with Up-arrow PT and aPTT hourglasses

Neonates are at risk of developing vitamin K deficiency because they lack the gut bacteria that produce vitamin K. It is also not present in breast milk. It is diagnosed via the presence of neonatal hemorrhage and/or increased PT and aPTT. Neonatal hemorrhage can manifest on days 2-7 of life, resulting in mucocutaneous bleeding (e.g., epistaxis), easy bruising, gastrointestinal bleeding, and/or intracranial hemorrhage.

Etiologies

Liver Disease

Liver Diseased

Severe liver disease is associated with fat malabsorption, which reduces the absorption of vitamin K. Deficiency can occur in 7-10 days in acutely ill patients with liver disease.

Chronic Antibiotic Use

Crone with ABX-guy

Chronic use of broad-spectrum antibiotics, especially cephalosporins, will reduce vitamin K's absorption in the body. This occurs due to the antibiotics killing bacteria that contribute to vitamin K production in the gastrointestinal tract. In addition, N-methylthiotetrazole side chains on cephalosporins are hepatic vitamin K epoxide reductase inhibitors, resulting in a deficiency of vitamin K.

Vitamin K Antagonists

Ant-in-a-toga Antagonizing Viking (K) King

Patients taking vitamin K antagonists such as warfarin may be at risk of developing vitamin K deficiency. Severe deficiency can occur if the patient experiences rat poison intoxication, as this acts similarly to warfarin.

Malabsorption

Intestine-mallet

Vitamin K is fat-soluble. Disorders leading to impaired fat absorption will reduce the absorption of vitamin K. Those disorders include cystic fibrosis, biliary disease, pancreatic disease, celiac disease, and Crohn's disease.

Dietary Deficiencies

Broken Nutritional-plate

The primary sources of vitamin K for the body come from the diet and from intestinal bacterial production. Dietary deficiency of vitamin K is rare in healthy individuals and takes several weeks or months to occur. However, severely malnourished patients and heavy drinkers are at risk of developing this condition.

Diagnosis

Normal Bleeding Time

Normal-sign Blood Clock

Bleeding Time (BT) is a marker of platelet function. Because vitamin K deficiency doesn't affect platelets, patients can have a normal bleeding time.

Increased PT and PTT

Up-arrow PT clotting-hourglass and Partial PTT clotting-hourglass

Vitamin K deficiency will reduce the synthesis of coagulation factors II, VII, IX, X, protein C, and protein S. This will result in an increased prothrombin time (PT), which is a marker of the extrinsic pathway of coagulation, and increased partial thromboplastin time (PTT), which is a marker for the intrinsic pathway of coagulation.

Considerations

Neonatal Vitamin K Injection

Neon-baby Viking (K) King with Syringe

Due to the lack of production of vitamin K in neonates, a vitamin K injection is given at birth to prevent hemorrhage.