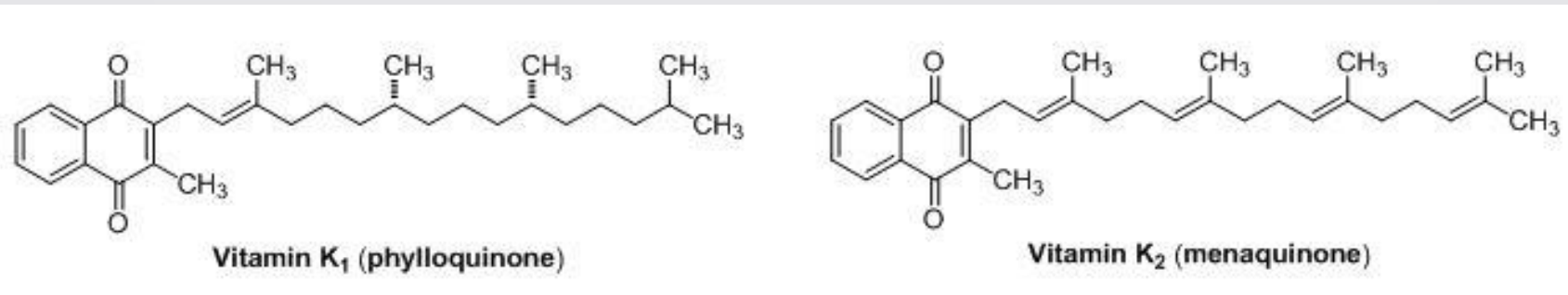




Vitamin K

Vitamin K

- A fat-soluble vitamin
- Common chemical structure; 2-methyl-1,4-naphthoquinone
 - Vitamin K₁..... Phylloquinone
 - Vitamin K₂..... Menaquinones (MK4 - MK13, due to the length of their unsaturated isoprenyl side chains)





Vitamin K

- Cooking and freezing processes cause disruption of vitamin K.
- In dietary supplements, different forms of vitamin K may be used such as vitamin K₁ as phylloquinone or phytonadione (a synthetic form of vitamin K₁) and vitamin K₂ as MK-4 or MK-7.
- Menadione (vitamin K₃), which is another synthetic form of vitamin K, is not used in dietary supplements due to the scientific study results showing the hepatotoxicity of this form.



Main Sources

- Phylloquinone:
 - green leafy vegetables
 - olive oil, canola oil, cotton oil, soybean oil
- Menaquinones:
 - bacteria origin
 - animal-based and fermented foods (egg yolk, butter, cow liver, some cheeses, fermented soy products)
 - produced by bacteria in the human gut



Function

- Hemostasis (blood clotting);
- Coenzyme for enzymes required for the synthesis of proteins involved in hemostasis (e.i. Prothrombin)
- The liver synthesizes four proteins using vitamin K (Factors II, VII, IX, X) and these factors are essential for blood clotting.



Function

- Bone metabolism;
- The role of vitamin K effect on bone metabolism has not been clarified yet.
- Essential for the production of some proteins which are involved in bone metabolism
- Functions in calcium metabolism



Use of Vitamin K

- Before/after operations
- After birth
 - To eliminate the risk of vitamin K deficiency bleeding in newborns
- Against osteoporosis
 - Consumption of calcium and vitamin D, during childhood, adolescence and early adulthood, is important to maximize bone mass and reduce the risk of osteoporosis



Use of Vitamin K

- Antiatherosclerotic
 - The role of vitamin K on arterial calcification is yet unclear.
 - Matrix Gla-protein is a vitamin K-dependent protein that may play a role in the prevention of vascular calcification.
- To counteract the overdose of warfarin and derivatives.
- In case of coumarin poisoning.
- Anticancer (not enough scientific proof)



Recommended Intake

Age	Male	Female	Pregnancy	Lactation
0-6 months	2 µg	2 µg		
7-12 months	2.5 µg	2.5 µg		
1-3 years	30 µg	30 µg		
4-8 years	55 µg	55 µg		
9-13 years	60 µg	60 µg		
14-18 years	75 µg	75 µg	75 µg	75 µg
19+ years	120 µg	90 µg	90 µg	90 µg



Deficiency

- Rare in adults
- Newborns are in risk group due to poor vitamin K transport via placenta and low vitamin K content of breastmilk.
- People with malabsorption disorders or the patients taking drugs which affect vitamin K metabolism may suffer from vitamin K deficiency.



Deficiency Symptoms

- Bleeding and hemorrhage (nose, gastrointestinal tract, through body cavities etc.)
- Reduction of bone mineralization and osteoporosis



Cautions

- In case of long term antibiotic or chemotherapeutic use, need for vitamin K may increase due to the damaged intestinal flora.
- Vitamin K intake at high doses increases hemorrhage risk.



Interactions

- Broad spectrum antibiotics may reduce vitamin K production.
- Bile acid sequestrants such as colestyramine and colestypol, orlistat, which is a drug used for the treatment of obesity, reduce the absorption of vitamin K.
- Salicylates may cause vitamin K deficiency.
- Vitamin K antagonizes the activity of warfarin
- High doses of vitamin A and vitamin E may cause vitamin K deficiency.