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ALL ABOUT SUPPLEMENTS

Vitamin K

Vitamin K strengthens bones, protects arteries, and may help prevent cancer and other degenerative diseases

In 1929, a Danish researcher discovered that when chicks were fed a fat-free diet, blood leaked out of their arteries and into their body tissues. Furthermore, blood taken from these chicks coagulated very slowly. Delving deeper into the mystery, he discovered that a special substance was required for blood clotting, and that these chicks lacked it because the substance is found only in the fatty parts of food.

He dubbed this blood-clotting substance the “koagulation vitamin.” We since have learned that this substance, which we now call vitamin K, plays a vital role in blood clotting. But this is only one of its several roles. Vitamin K helps keep bones strong and slows the calcification of tissues. It also can destroy certain types of cancer cells, protect the skin, and may prove useful in the fight against Alzheimer’s disease, diabetes, and aging.



Three Related Substances

Vitamin K is actually a group of three related substances: K1, known as phyloquinone; K2, which comprises a group of compounds called the menaquinones; and K3 or menadione, which is a synthetic version of the vitamin.

This fat-soluble vitamin is found in the fatty part of foods. Broccoli and other leafy green vegetables, and canola, soybean, and other plant oils, are our primary dietary sources of vitamin K1. Vitamin K2 is found in butter, cow liver, chicken, egg yolk, certain cheeses, and fermented soybean products. Microorganisms in the intestines also synthesize it. The body stores only limited amounts of vitamin K in the liver, so foods rich in this vitamin must be consumed regularly.

Outright deficiencies of vitamin K are rarely seen in healthy adults eating well-balanced diets. Several conditions, however, can set the stage for vitamin K deficiency, including:

- a poor or restricted diet
- Crohn’s disease, ulcerative colitis, or other ailments that interfere with nutrient absorption
- liver disease that interferes with vitamin K storage
- certain drugs, including broad-spectrum antibiotics, cholesterol-lowering agents, mineral oil, aspirin, and blood thinners.

While severe deficiencies of the vitamin are rare, more subtle deficits may increase the risk of osteoporosis, arteriosclerosis, and other ailments.



Crucial to Bone Health

Calcium is necessary for strong bones, but incorporating this mineral in bone tissue involves a complex series of biochemical steps. One of these is the “activation” of a protein called osteocalcin during a process known as gamma-carboxylation.

Osteocalcin is like the studs inside the walls of a house; it is a structural framework that helps hold calcium in place in the bones. But osteocalcin cannot do the job until vitamin K converts it into its active, bone-building form.¹

Bone health is directly related to the activation of osteocalcin.² If there is not enough vitamin K available to activate this protein, large amounts of inactive osteocalcin will circulate in the bloodstream. If supplemental vitamin K is given to people with excess inactive osteocalcin, the circulating levels will drop³⁻⁵ as more of it is made available for incorporation in the bones.

Vitamin K is closely linked to osteocalcin and bone health:

- Low levels of vitamin K in the blood⁶ and in the diet⁷ are associated with low bone mineral density in women.
- Taking supplemental vitamin K appears to enhance the bone-building process by increasing the attraction of calcium to

bone tissues and improving bone density.^{8,9}

- Supplemental vitamin K also reduces the amount of calcium lost in the urine,^{5,8} meaning that more of the mineral is available for building bone.
- Vitamin K2 may slow the break-down of bony tissue.¹⁰

Vitamin K also helps the body manufacture a protein called matrix G1a protein, another substance that helps build strong bones.

Several researchers have investigated whether vitamin K can prevent osteoporosis and bone fractures. Low levels of the vitamin were associated with increased risk of bone fractures in studies from the 1980s and early 1990s.^{11,12} In 1998, researchers used data from the prestigious Nurses Health Study to examine the link between vitamin K and hip fractures in women.¹³ The diets of over 70,000 women, ranging in age from 38 to 63, were analyzed for 10 years. The researchers found that consuming about 110 micrograms of vitamin K per day reduced the risk of breaking a hip by approximately 30%.

In Japan, vitamin K has been an approved treatment for osteoporosis since 1995.



Protecting Arteries from Calcification

Intriguing research suggests that as vitamin K helps direct calcium to the bone and holds it there, it also helps keep calcium out of the linings of arteries and other body tissues, where it can be dangerous.

The arteries that carry fresh blood throughout the body are normally pliable, contracting and relaxing on command to keep the blood flowing smoothly. But over time, they tend to thicken and stiffen as the body deposits calcium into the artery walls. This condition, known as arteriosclerosis, is a risk factor for heart disease and stroke.

Early-stage research suggests that vitamin K may help prevent arteriosclerosis.¹⁰ Scientists from the Netherlands¹⁴ have confirmed that vitamin K activates matrix G1a protein, a powerful inhibitor of arterial calcification.¹⁵ Matrix G1a protein, and perhaps other vitamin K-dependent proteins, are believed to help regulate calcium's movement throughout the body, directing it away from the arteries and into the bones.

In a 2002 study,¹⁶ researchers compared vitamin K status to the amount of calcification in the coronary arteries of 600 men. They found that men with the lowest vitamin K status had much more calcification in their coronary arteries than did men with better vitamin K status.

More research is needed, but it appears that by regulating calcium, vitamin K simultaneously reduces the risk of both osteoporosis and arteriosclerosis.

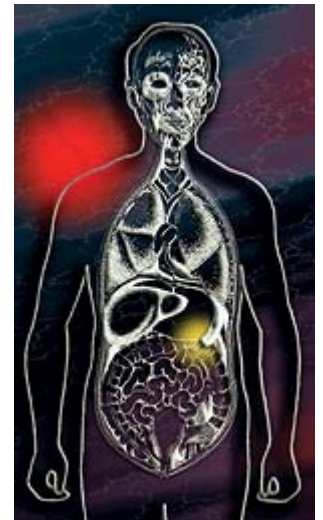
Cancer Prevention, Other Benefits

A flurry of new studies suggests that vitamin K may help combat cancer. Vitamin K1 appears to play a role in cell replication, transformation, and survival,¹⁷ and can inhibit cell growth.¹⁸ Vitamin K2 encourages the suicide (apoptosis) of pancreatic and ovarian cancer cells,¹⁹ while vitamin K2 analogs induce the same kind of programmed cell death in leukemia cells.²⁰ These preliminary reports suggest that vitamin K may one day be used to "instruct" cancer cells to stop their dangerous, unregulated growth.

While most of the research on vitamin K has examined its ability to clot blood, strengthen bones, and destroy certain cancer cells, other lines of inquiry hint at additional ways that this vitamin may improve our health.

Alzheimer's disease

This terrible disease has been linked to the apolipoprotein E4 genotype in some studies. Researchers have found that the vitamin K blood levels may be lower in those with this genotype,²¹ a discovery that may be linked with evidence that vitamin K helps regulate brain biochemistry. It may be that a vitamin K deficiency is a contributing factor to the development of Alzheimer's disease, and that vitamin K supplementation will help combat it.



Skin care

University of Miami researchers looked for ways to prevent the significant bruising that accompanies such cosmetic procedures as pulsed dye laser treatment. In a study of 22 patients, they found that applying topical vitamin K to the face after laser treatment significantly reduced the severity of bruising.²²

Blood sugar regulation

Relatively large amounts of vitamin K are found in the pancreas, the organ that manufactures the insulin that regulates blood sugar. In a study with laboratory animals, Japanese researchers found that a deficiency of vitamin K interferes with insulin release and glucose regulation in ways similar to diabetes.²³

Protection against cell damage

Vitamin K may also have antioxidant properties,²⁴ making it helpful in preventing the accumulating oxidation damage to cells and tissues associated with aging.



Recommended Dosages Vary

The average American adult consumes 59-82 micrograms (mcg) of vitamin K per day.²⁵ This is less than the adequate intake levels set by the Food and Nutrition Board of the National Institute of Medicine, which recommends 120 mcg per day for men and 90 mcg per day for women.

Some studies have suggested that larger amounts may help protect against osteoporosis and calcification of the arteries. Supplements containing from 25 mcg up to 10 milligrams (mg) of the vitamin are readily available.

According to the Food and Nutrition Board, "No adverse effects associated with vitamin K consumption from food or supplements have been reported in humans or animals."²⁶ **You should, however, check with your physician if you are taking medications such as blood thinners that may be affected by vitamin K.**

Conclusion

Vitamin K's importance as a blood-clotting agent is well established. More recent research, however, has demonstrated that vitamin K may play a variety of health-promoting roles. This research suggests that vitamin K helps prevent osteoporosis by "guiding" calcium into the bones and holding it there; reduces the risk of heart disease and stroke by directing calcium away from the arteries; kills cancer cells; and enhances skin health. Vitamin K may be useful in combating Alzheimer's disease and diabetes, and also can exert antioxidant and anti-inflammatory properties that could make it useful in combating the symptoms of aging.

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