



VITAMIN K₂

Promotes bone and cardiovascular health

VITAMIN K: KEEPING CALCIUM WHERE IT BELONGS

Why are so many Canadians plagued by a lack of calcium in the bones (osteoporosis) despite having an excess of calcium in the arteries (atherosclerosis)? This is the calcium paradox. Researchers have finally uncovered the connection between these two serious health conditions: vitamin K. Vitamin K is a group of fat-soluble vitamins first recognized for their role in blood clotting. New studies show that sub-clinical, non-hemostatic (non-blood) vitamin K deficiency in tissues such as bone and blood vessels exist widely in seemingly healthy adult populations. At the same time the discovery of vitamin K-dependent proteins in bone has revealed this vitamin's most important function – aiding bone development by acting as a regulator and director of calcium in the tissues. Vitamin K helps guide calcium towards the areas of the body where it is needed, such as the skeleton, and away from areas where it could have a negative effect, such as the cardiovascular system.

THE K₂ ADVANTAGE

Natural Factors Vitamin K₂ features vitamin K₂ as menaquinone-7 (MK-7), an advanced, fat-soluble form of vitamin K that serves multiple functions in the body. The K family consists of a trio of vitamins: K₁ (phylloquinone), naturally occurring in leafy green vegetables and plant oils; K₂ (menaquinone) present in butter, cows liver, eggs, certain cheeses and natto, a fermented soybean food; and K₃, a synthetic form of the vitamin. K₃ has been shown to have toxic effects on the liver and K₁ doesn't have adequate benefits for calcium metabolism to dramatically improve osteoporosis or atherosclerosis. Only K₂ in the form of MK-7 has been shown to offer 24-hour protection from a single daily dose. Other commercially available subtypes of K₂, such as MK-4, only last four to six hours in the body and are required in much larger dosages to be effective.

VITAMIN K AND BONE HEALTH

Although calcium is abundant in foods and dietary supplements, it can't be fully utilized by the body without going through a number of biochemical channels. Scientific evidence shows that vitamin K₂ is very active in the tissues, where it serves to increase the absorption of calcium into the bones by facilitating the mineral-binding function of osteocalcin. Osteocalcin is an important protein synthesized by bone-forming cells called osteoblasts. Osteocalcin helps build bones and hold calcium in the bones.

Osteoporosis is one of the top health concerns for menopausal women. A number of prescription medications are

now available to treat osteoporosis, however many of those make bone density test results look better without really improving the strength of bones or reducing the incidence of fracture. At least a dozen clinical studies now document the true bone-building benefits of vitamin K₂ (Weber). The effect has been extensively studied in menopausal women, the group with the highest risk of osteoporosis and hip fracture. In this group, vitamin K₂ had been shown to improve bone strength and bone mineral density and reduce the rate of hip fracture. Its bone-building and fracture-preventing effects have also been proven in patients receiving steroid therapy, dialysis patients, and people with bone density loss due to paralysis.

VITAMIN K AND ATHEROSCLEROSIS

When soft tissues such as blood vessels are damaged, the body responds to this injury by invoking an inflammatory response that can result in calcium deposits in the damaged tissue. This is a major mechanism underlying the development of coronary artery disease which leads to heart attack. Epidemiological studies show that increased dietary intake of K₂ (but not K₁) is associated with a reduced risk of coronary heart disease. The Rotterdam study, a population-based study of almost 8,000 men and women over the age of 55, investigated factors that determined the occurrence of cardiovascular disease. All other factors being equal, participants with the highest vitamin K₂ intake had 50% lower risk of death from coronary heart disease and calcification of the coronary arteries than people with the lowest intake of K₂ (Geleijnse). Animal studies show that K₂ not only prevents hardening of the arteries, but can actually reverse the calcification of highly calcified arteries (Schurgers). Vitamin K₂ does this by activating MGP, a powerful inhibitor of vascular and other soft tissue calcification.

K₂ – THE NEW ANTI-AGING NUTRIENT?

"When it comes to skin, it seems that a K₂ deficiency might be written all over your face." In her book, *Vitamin K₂ and the Calcium Paradox*, Dr. Rhéaume-Bleue explains the link between excessive skin wrinkling and vitamin K₂ deficiency. The severity of a postmenopausal woman's facial wrinkles predicts her risk for osteoporosis, according to recent research. In fact, Japanese women have fewer wrinkles and less skin sagging than North American women of the same age (Rhéaume-Bleue). Could it be due to their high blood levels of vitamin K₂? Vitamin K₂ deficiency may even contribute to varicose veins, which affect half of North American women and up to 40% of men. Suboptimal

vitamin K₂ levels contribute to vein wall bulging and distension. According to Dr. Rhéaume-Bleue, "Vitamin K₂ may be your best friend in winning the war on those achy, unattractive varicose veins."

CONDITIONS ASSOCIATED WITH K₂ DEFICIENCY

- Osteoporosis
- Atherosclerosis
- Increased risk of cancer including breast, prostate, and liver cancer
- Diabetes
- Varicose veins
- Wrinkles
- Dental cavities
- Narrow, crowded dental arch
- Crohn's disease
- Kidney disease

K₂ AND DENTAL HEALTH

Vitamin K₂ plays an important role in dental health. Teeth contain a special tissue called dentin that, like bones, secretes the K₂-dependent protein osteocalcin to regulate calcium deposition. This may explain why the salivary glands have the second highest concentration of K₂ (after the pancreas) of all the tissues in the body. Both vitamin K and K-dependent proteins are secreted into the saliva, although the precise role of these is still unknown (Masterjohn). It stands to reason that vitamin K₂ will soon be shown to have the same mineral-building benefits in teeth as it does in bone via the action of osteocalcin.

DIABETES: THE VITAMIN K CONNECTION

Recent research has revealed that our bones help control diabetes. Osteocalcin, the hormone produced by bones to increase density, has also been shown to improve both insulin secretion and sensitivity. Insulin resistance is a major underlying factor in type 2 diabetes. Since osteocalcin is a vitamin K-dependent protein, scientists are questioning whether the newly identified widespread deficiency of the vitamin could be an underlying factor in the equally widespread diabetes epidemic. The potential therapeutic benefit of vitamin K in diabetes remains to be investigated in human trials.

LIVER CANCER AND VITAMIN K

Research shows that vitamin K is a potential inhibitor of certain kinds of liver cancer. Hepatocellular carcinoma (HCC) is a type of cancer that can affect people who have been infected with hepatitis or who have suffered from cirrhosis of the liver. Vitamin K content is decreased in areas of the liver affected with HCC compared to non-tumorous areas of the liver. At least three clinical trials have shown a marked reduction in the risk of developing HCC in individuals taking vitamin K₂ (Kaneki, *et al*).

VITAMIN K IN THE DIET

Vitamin K₁ is easy to obtain from green leafy vegetables. The bacteria in our intestines will convert some of that to K₂, but not enough to prevent or treat atherosclerosis and osteoporosis. K₂ is found in the diet in natto, a fermented soybean food popular in Japan, as well as in butter, meat, egg yolks, and organ meats from animals that are fed grass instead of grain. As grass-fed animal products are rare nowadays and a taste for natto is difficult to acquire for most Westerners, a vitamin K₂ supplement is the best way to ensure you are getting an optimal daily dose of this important nutrient.

SAFETY

Vitamin K₂ is very safe with no known upper limit or toxic dose. An optimal daily intake of vitamin K has not yet been established.

Pregnancy and lactation: Safe during pregnancy and lactation. Pregnant and breastfeeding women should be especially conscientious about their vitamin K intake since vitamin K deficiency has been linked to birth defects.

Children: Up to one-half the adult dose.

Drug interactions: Doses of vitamin K₂ over 45 mcg daily may negatively interact with oral anticoagulant therapy. Patients receiving blood-thinning medications (e.g., Warfarin) should not take vitamin K without consulting a health care practitioner.

Contraindications: None known.

DOSAGE

1 capsule daily or as directed by a health care practitioner. Each capsule contains 100 mcg of vitamin K₂ in the form of menaquinone-7 from natto beans.

Researchers worldwide are only beginning to uncover the many essential roles that vitamin K₂ plays in our health. Our growing understanding of this nutrient is rapidly redefining cardiovascular disease as an illness of nutritional deficiency. In addition, a vitamin K₂ deficiency appears to be an underlying factor in the development of diabetes and liver cancer. Vitamin K₂ also plays an essential role in bone metabolism and promoting healthy teeth. For most people, diet alone will not help them meet their daily requirement of vitamin K₂. Daily use of Natural Factors Vitamin K₂ makes it easy to get optimum levels of this important nutrient.

KEY REFERENCES

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