

Vitamin K: More than Just the "Klotting" Vitamin!

Vitamin K is a fat soluble "vitamin", now known for over 70 years to be imperative for proper coagulation, which in native Danish tongue of its discoverer is spelled with a "K".

But did you know that vitamin K is technically not a vitamin, and has several other important physiological functions? If not, then further familiarity with this usually neglected nutrient is worth review.

Vitamin K is actually a fat soluble phytonutrient (technically a sub-classification of terpenes, a mixed isoprenoid chromanol sub-group known as the quinones). There are actually three kinds of vit. K:

K1, phylloquinone,
K2, menaquinone,
K3, menadione, synthetic Vitamin K.

The chlorophyll rich greens, broccoli and soybean are major sources of vitamin K1. Fermented soy, beef liver, chicken, egg yolk, butter, some cheeses, are Vitamin K2 sources (therefore technically not a phyto-nutrient but rather a "zoo-nutrient", pronounced zoo'-o). Fermentation via healthy, eubiotic intestinal micro-organisms occurs as well, providing more Vitamin K2. However vitamin K2 is very poorly absorbed (1a).

We humans enjoy only limited hepatic storage of Vitamin K.

Coagulation difficulties related to deficiencies of vitamin K are rarely seen in reasonably healthy humans with reasonably balanced diets. Nonetheless vitamin K deficiency may be seen with including:

- Very restricted chronic fad, weight loss diets, "detox" and severe cleansing diets/fasts, and of course severe bulimia and anorexia,
- Severe dysbiosis, dumping syndromes, diarrheas, malabsorption, and associated diseases such as ulcerative colitis and Crohn's disease,
- Hepatic disorder, disease and degeneration,
- Pharmacological iatrogenic causes including overly strict vit. K avoidance with anti-coagulant therapy, cholesterol lowering medications, even chronic mineral oil and NSAID ingestion.

Even so acute hypo-vitaminosis K is rare. However, subtle sub-optimal vitamin K levels may well increase the risk of osteoporosis, arteriosclerosis, perhaps some cancers, and maybe even Alzheimer's and diabetes!

Boning Up on Vit K.

Poor vitamin K blood levels and dietary intake are directly correlated with female osteopenia (low bone mineral density) and frank osteoporosis with hip fracture.

(6,7,11,12,13) It is well established that supplemental vitamin K promotes osteotrophic (bone building) processes and slows osteoclastic (bone depleting) processes by enhancing the bonding of calcium to the protein matrix tissue of bone, thereby increasing bone density. Further more, vitamin K assists in the very manufacture of the protein boney matrix itself (known as matrix G1a protein)! (5,8,9,10)

Osteocalcin is the lattice work matrix into which minerals, especially calcium, are incorporated (via gamma-carboxylation). To do so osteocalcin must be activated to perform its bone-building duties. Said activation is dependant on vit. K. (1, 2) Diagnostically, large amounts of inactive osteocalcin suggests sub-optimal vit. K. If so, supplemental vitamin K will lower osteocalcin blood levels. (3-5) Similarly, supplemental vitamin K can also reduce urinary calcium loss related to such osteoclastic processes. (5, 8)

In 1998, researchers used data from the prestigious Nurses Health Study and found that consuming about 110 micrograms of vitamin K per day reduced the risk of breaking a hip by approximately 30%! (13) In fact, vitamin K has been an approved treatment for osteoporosis in Japan since 1995!

It should be noted that Kaneki et al found that Japanese women with identical KI levels but twice the K2 levels, (specifically MK7 as found in natto, a fermented soy product,) had significantly less osteoporotic bone fracture.

Anti-Artery "Klogging"

Vitamin K is not only vital to enmeshing calcium into bone; it appears to simultaneously inhibit calcium's incorporation into the lining of our arteries. (9, 16) Such undesirable incorporation yields stiffening of the otherwise flexible arteries (atherosclerosis), which is a well known risk factor for heart disease and stroke. Therefore vitamin K may help prevent arteriosclerosis, though more studies are required. (10) Still, it appears that in activating the afore mentioned matrix G1a protein (and perhaps other vitamin K-dependent proteins), vitamin K strongly inhibits arterial calcification while supporting bone calcification! (14, 15).

Kan K Kombat Kancer?

Phylloquinone supports cell replication, transformation, survival and inhibition. (17, 18) Menaquinone and its analogues promote normal cell self-destruction (apoptosis) in pancreatic, ovarian, and leukemia cancer cells. (19, 20) Therefore, it may be that optimal vit. K status inhibits cancer cell formation and growth to some extent.

The Alzheimer's Konnection

Studies hint that vitamin K blood levels may be lower in those with apolipoprotein E4, the genotype that has been linked to Alzheimer's, and moreover that vitamin K may help modulate CNS biochemistry. (21)

Blood Sugar Kontrol

Vitamin K is relatively abundant in the pancreas, the endocrine function of which is to manufacture and secrete insulin to prevent hyperglycemia. In a study with laboratory animals, Japanese researchers found that in lab animals a vitamin K deficiency interferes with insulin release and glucose regulation in ways that mimic diabetes. (23)

SKin Kare

Finally, of at least passing interest, we note that University of Miami researchers reported that in a small study applying topical vitamin K to the face after laser treatment significantly reduced the severity of bruising. (22)

ReKommended Dosages

In spite of the Nurses Health Study mentioned above, the Food and Nutrition Board of the National Institute of Medicine advises 90 mcg and 120 mcg daily for women and men respectively. American adults consume on average 59-82 micrograms (mcg) of vitamin K per day. (25) This is just another reason why leafy greens need to be added to the diet, especially in those avoiding cholesterol and calorie rich but vitamin K2 abundant foods mentioned above. Even direct vit. K supplementation is extremely safe as large doses do not "cause" clotting."(26)

One should, however, check with ones physician if taking medications such as blood thinners whose effectiveness may be affected by dietary and supplemental changes in the intake of vitamin K. A good resource for those on anticoagulants is the web site www.vitk.org. It should be noted when anti-coagulants are given, the advice to "avoid vit. K" should perhaps be more exactly understood as the advice to *inform your physician of any marked dietary or supplementation changes that may significantly increase vit. K such that the prescribing physician can evaluate the need to re-calibrate the dosage needed to maintain effective anti-coagulation activity while promoting optimal vit K status.*

Konclusion

Vitamin K's vital importance to proficient blood-clotting has been appreciated for over seven decades, but we have clearly demonstrated that coagulation is not its lone function. More recent investigations promote vit. K as yet another nutrient involved in maintaining strong bones and clear arteries, two very important functions considering the prevalence and morbidity of osteoporosis and cardio-vascular disease. Future research may more clearly define vit K's possible importance in preventing certain cancers, Alzheimer's disease and diabetes, and even topical post-laser recuperation. In the mean time, the above information is at the very least yet another of the many reasons to enjoy a diet abundant in chlorophyll rich greens and fermented soy.

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