

# Rediscover Vitamin K

*"Which form of vitamin K should you use? K1, K2, or K3? And what about MK-4 thru MK-10? Let's clear the confusion."*

Is vitamin K on your nutritional radar screen? Mom always said "eat your green leafies" but as kids we never quite understood why. If we knew back then what we know now about the benefits of vitamin K, it might have made it a little easier.

We are all familiar with the profound effects vitamin D has on our metabolism. Some clinicians are calling vitamin K the next vitamin D due to its systemic effects. Vitamin K has powerful effects upon bone building, cardiovascular health especially plaque build up, certain forms of cancer and even dementia in addition to its commonly associated coagulation effects.

Three basic forms of vitamin K exist. K1 which is from green leafy plants is called phylloquinone or phytoquinone. "Phyto" helps me think plants. Sources of K1 are green leafy vegetables like collard greens, spinach, kale, brussels sprouts, broccoli and



other foods like cauliflower and olive oil.

K2 is called menaquinone and comes primarily from fermentation. For example, K2 is found in fermented soy or natto, some cheeses, sauerkraut, butter from grass fed cows, kim chi and certain meats. We make K2 naturally through the fermentation of anaerobic bacteria.

Now this is where things get a little confusing because there are subdivisional forms of me-

naquinones. They are abbreviated MK-4 through MK-10. The number after the MK refers to how many isoprene units they contain. It's really a good thing to distinguish them because different forms target different organs and have different half lives.

MK-4 and MK-7 are the forms most found in nutritional supplements but have different roles. MK-4 has a half life of a few hours and works mostly with the liver, synthesizing blood clotting factors.

MK-7 comes from a fermented soy product called natto and has a half life of a few days. MK-7 is the form that has the cardioprotective benefits as well as bone building properties.

The third form of vitamin K, K3, represents several synthetic forms that we will not discuss.

So how can we apply vitamin K clinically? Osteocalcin is a non-collagenous protein which is made by the osteoblasts during bone formation. Osteocalcin must be carboxylated which allows it to bind to calcium. Vitamin K is essential for this carboxylation process.

Researchers have found that low levels of carboxylated osteocalcin are accompanied with low levels of vitamin K. The inverse is also true; high levels of carboxylated osteocalcin are accompanied with elevated levels of vitamin K. If you want to build healthy bones, we need adequate amounts of carboxylated osteocalcin.

Can you see why vitamin K is so important to bone health? Several studies have shown vitamin K to be a key factor with vitamin D, calcium and trace minerals to reduce osteoporosis. It appears that when using the plant form, phylloquinone or K1, significantly higher doses are needed to attain adequate levels of carboxylated osteocalcin.

K2 or menaquinone has been shown to have some exciting cardiovascular protective attributes. Vitamin K dependent proteins have been shown to inhibit vascular calcification. Activation of these proteins via carboxylation depends on the availability of vitamin K, specifically K2. The 2004 Rotterdam Study showed "those consuming the upper levels of menaquinone had the lowest levels of severe aortic calcification, cardiovascular mortality as well as all cause mortality." "People who consumed 45 mcg lived seven years longer than participants

ingesting 12 mcg per day." A follow up study called the Prospect Study tracked 16,000 people for 10 years. "Each additional level of dietary K2 of 10 mcg resulted in nine percent fewer cardiac events."

The American Journal of Clinical Nutrition in their 2008 87th issue reported on an 8 year prospective study following over 11,000 men comparing vitamin K and prostate cancer. Their conclusions: "Our results suggest an inverse association between the intake of menaquinone (K2), but not that of phylloquinone (K1) and prostate cancer."

What is the recommended dose of vitamin K? That depends on who you ask. Dr. Vermeer, one of the principal European researchers, suggests 45 to 185 mcg. It appears most of his interests are in coronary heart disease and vascular integrity. In Japan, scientists are using 45-90 mg to treat osteoporosis with good success and without side effects. More doesn't mean better, but taking more is not causing side effects.

Biotics Research combines 500 mcg of K1 and 50 mcg of K2 as MK-7 with the antioxidants SOD and Catalase in a new product called Bio-K Forte Caps. If you have patients at any stage of osteoporosis or heart disease, encourage them to increase dietary levels of both vitamin K1 and K2 and add Bio-K Forte to their supplement program.

I think you can see why the different forms of vitamin K are worth paying attention to. Perhaps this quick refresher will put vitamin K back on your radar screen reminding you how this forgotten nutrient works and how our western diets are so deficient.

Thanks for reading this week's edition of the Tuesday Minute. I'll see you next Tuesday.