



Menaquinone-7 (Vitamin K2)

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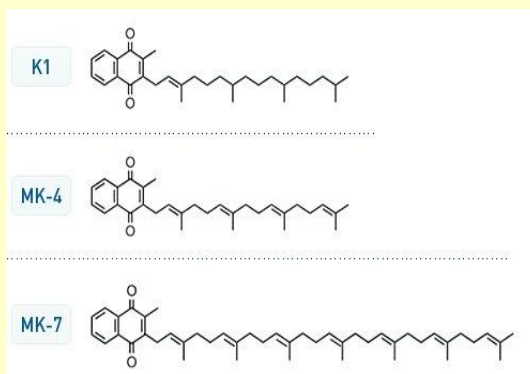
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When most people hear Vitamin K, they think "coagulation vitamin", associating it with its role in the blood clotting process; however, a second variant of this nutrient called vitamin K2 is changing the way we think about health and longevity. The benefits of vitamin K2 are strongly tied to the Calcium Paradox: extra calcium makes bones healthier and stronger, but in circulation, high calcium levels create rigid blood vessels, leading to hypertension and cardiovascular disease. Scientists have found vitamin K2 tackles both issues by activating proteins which either adhere calcium to bone or remove calcifications from arteries.

Despite these amazing benefits, published studies have found that most adults and children are vitamin K deficient. One study found that even in seemingly healthy individuals, 30% of the proteins normally activated by Vitamin K remained inactive due to a lack of this fat soluble vitamin. While vitamin K1 is easily found in a healthy Western diet (spinach, broccoli, kale, etc.) only 10-20% reaches circulation and since it has a very short half-life and the majority is snagged by the liver for proper blood clotting, very little makes it to tissues in peripheral parts of the body. This is where vitamin K2 becomes essential. All K vitamins are similar in structure, but differ in the length of the side chain. The longer the side chain, the longer they stay in the blood, the more completely absorbed, and the smaller dosage needed.

There are three forms of Vitamin K available as supplements: Synthetic vitamin K1 (phyloquinone) is the most widely known form used by the body for coagulation, synthetic vitamin K2 as MK-4 (menaquinone), and natural vitamin K2 as MK-7 (menaquinone-7). You can see the length of their side chains below. Because of MK-7's long side chain it is more readily available for use outside the liver in bones, arteries and soft tissues. A study appearing in the journal Blood in 2007 studied the three forms of vitamin K and found MK-7 consistently most effective over both vitamin K1 and the synthetic MK-4 because of its greater and longer lasting bioavailability.



Current recommended daily intakes of vitamin K are based on the body's need for proper blood clotting, however for optimal bone and cardiovascular health, international studies have found that 45mcg of vitamin MK-7 daily is ideal. In fact since vitamin K2 has a half-life of more than 3 days and is redistributed in the circulatory system via VLDL and LDL cholesterol (making it available to bone, vasculature and liver tissues), daily intakes of 45mcg of vitamin K2 means no extra supplemental K1 is needed. However, unlike vitamin K1, vitamin K2 is of bacterial origin and not easily found in the Western diet. The most plentiful source of K2 as the long-chain MK-7 is found in the Japanese dish natto, traditionally prepared by wrapping boiled, fermenting soybeans in rice leaves and has been used since ancient times for improved bone and heart health. We also find vitamin K2 in food products such as egg yolks, meat and cheeses, however to reach 45mcg daily, you would have to consume unrealistic amounts of these foods. (See side bar on next page.) Fortunately, supplements like Douglas Liquid Vitamin D & K allow you to easily meet this recommendation.

As mentioned earlier, Vitamin K2 works by activating proteins within the body. In bone, it activates osteocalcin, a protein required to bind calcium to the bone matrix, thus strengthening the skeleton. This is especially important for children and young adults because peak bone mass is reached in our late 20s after which bone mineral density begins to slowly decrease. The higher your bone density at peak mass, the longer good bone mineral density can be preserved. Also the osteocalcin levels in children are 8-10 times higher than in adults, therefore the need for vitamin K is higher to activate those additional proteins.

Unfortunately, the average dietary intake of vitamin K has dropped significantly in the past 50 years partly due to the easy availability of processed foods and a lack of emphasis on vegetables at meals. How many children do you know who eat hotdogs and mac-n-cheese everyday for lunch? This trend has led to a vitamin K deficiency in most children. But this can be corrected: in a study published in 2008 researchers found that increasing the vitamin K intake levels among children for two years resulted in stronger and denser bones

Vitamin K2 has also been proven to preserve bone mineral density. Two studies published in the Journal of Nutrition in 2001 and 2006 found that increased intake of MK-7 resulted in greater osteocalcin activation and reduced risk of hip fracture. In 2008 another in-depth study published in the European Journal of Epidemiology found that while calcium, magnesium, zinc and vitamin D are important for bone health, natural vitamin K2 was the key ingredient for bone preservation.

VITAMIN K2 & CARDIOVASCULAR HEALTH

While vitamin K2 helps build calcium deposits in bone, it has the completely opposite effect on the circulatory system by activating a protein called the Matrix Gla Protein (MGP) which is the most potent arterial calcification inhibitor known. Excess calcium attaches to the lining in arteries, creating calcification build-up and rigid artery walls both of which can impede blood flow to and from the heart. This is especially dangerous because your arteries can harden slowly over time with virtually no symptoms.

Arterial calcifications are also linked to several other diseases such as diabetes, hypertension, atherosclerosis and chronic kidney disease. Reducing calcifications on arterial walls lowers the risk of vascular damage and it has been shown that healthy arterial tissues typically contain 20-50 times more vitamin K2 than unhealthy arteries.

The population-based Rotterdam Study conducted over a 10 year period ending in 2004 discovered that consuming at least 32mcg of vitamin K2 daily reduced arterial calcifications by 50%, decreased the risk of cardiovascular death by 50% and was responsible for a 25% reduction in overall mortality. Another 8 year study done on women found that for every 10mcgs of vitamin K2 consumed, the risk of coronary heart disease dropped 9%.

Calcifications are also common among patients on anti-coagulation drugs which work by blocking certain clotting factors like the utilization of vitamin K. Present studies show that consuming 45 mcg of MK-7 daily is not likely to interfere with blood-thinning medications and could in fact protect against this problem by reducing vascular calcification by 37%. Checking with your doctor before taking this supplement is advised

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To consume 45 mcg of vitamin K2 daily, you would need to eat one of the following:

- 8.8 lbs beef
- 1.32 gallons milk*
- 1.32 gallons whole yogurt*
- 0.175 lbs soft cheese*
- 0.129 lbs hard cheese*
- 8 egg yolks
- 1 dropper of Douglas Vitamin D & K liquid

**Review our newsletters from March & April 2008 on the dangers of dairy*

Federal law requires us to notify you of the following:

1. Your individual health status and any required health care treatments can only be properly addressed by a professional healthcare provider of your choice. Remember: There is no adequate substitution for a personal consultation with your chosen health care provider. Therefore, we encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.
2. The Constitution guarantees you the right to be your own physician and to prescribe for your own health.