

“Vitamin K₂ and the Calcium Paradox”¹

A Quick Summary

| The Fat-Soluble Vitamins |
|--------------------------|
| Vitamin A |
| Vitamin D |
| Vitamin E |
| Vitamin K |

| Vitamin K | |
|-------------------|--|
| Vitamin K1 | The conventional form of vitamin K that you see on food labels and nutrition products. It is mostly found in green leafy vegetables and plants. <i>-Plays a major role in blood clotting</i> |
| Vitamin K2 | It was more recently found that the K2 form of vitamin K plays a very different role—not related to blood clotting <i>-Directs calcium into bone</i> <i>-Prevents calcium from building up in atherosclerotic plaques in the blood vessels</i> |

| Vitamins A, D and K2 work the best when they work together! |
|--|
| Vitamins A and D are <i>involved in the production</i> of a protein called osteocalcin , which carries calcium from the blood into the bone. It is also involved in the production of another protein called matrix gla protein (MGP) , which directs calcium away from blood vessels and soft tissues. Vitamin K2 is <i>required to activate</i> both osteocalcin and MGP, which essentially regulate where calcium goes. <u>Without vitamin K2, these proteins are useless.</u> |

| Vitamin K2 Supplements (2 forms available): | | |
|---|--------------------|-------------------|
| | Dose | Dosing Frequency |
| Menaquinone-7 (MK-7) | 120 mcg (or more) | Once daily |
| Menaquinone-4 (MK-4) | 45 mg (45,000 mcg) | Three times daily |

| Vitamin K2 may play a role in many health conditions, including: |
|--|
| -Osteoporosis |
| -Heart and vascular disease |
| -Rheumatoid arthritis |
| -Bone development |
| -Dental health |
| -Brain health (Alzheimer’s Disease) |
| -Diabetes |
| -Cancer |
| -Fertility |
| -Wrinkles |
| -Varicose veins |

What is the “calcium paradox”?

Patients taking higher doses of vitamin D and calcium for the prevention of osteoporosis may have an increased risk of developing atherosclerosis and heart disease, due to excessive calcium buildup in blood vessels.

Why is vitamin K2 important?

Vitamin K2 tells calcium where to go. It directs calcium out of the blood vessels and keeps it in the bone. This prevents calcium from accumulating in atherosclerotic plaques and promotes the healthy building of bone tissue.

How do we get vitamin K2?

We get most of our vitamin K2 from animal products in our diet. Grass feeding animals are able to convert vitamin K1 to vitamin K2.

The natural flora, aka “good bacteria”, in our gut also convert vitamin K1 to vitamin K2; but they do not provide us with enough of the vitamin to support our nutritional needs.

Are we getting enough vitamin K2?

Current recommendations for vitamin K intake are based on our need for vitamin K1. Because our bodies recycle vitamin K1, our dietary requirements are low and deficiency of vitamin K1 is very rare.

However, vitamin K2 is not recycled. It is only stored in small amounts in the body. If dietary intake vitamin K2 is low, vitamin K2 deficiency can occur in as little as seven days. Dr. Kate Rheaume-Bleue, N.D. presents evidence to suggest most individuals

are deficient in vitamin K2. She attributes this deficiency to the conditions listed above and provides preliminary evidence to support her claims. She argues that the high prevalence of vitamin K2 deficiency is most likely due to modern factory farming.

During the 1920s, the discovery of vitamins A and D allowed for supplementation of feed for cattle, poultry and pork. This led to a shift from pasture feeding to grain feeding of livestock. Additionally; animals no longer required sunlight to survive, which meant that they could now permanently stay indoors. This meant that animals were no longer getting enough vitamin K1 from grass. Thus; meat, dairy products and eggs were no longer providing us with the levels of vitamin K2 that were necessary to meet our dietary needs.

To support her argument, she discusses the population based studies of Dr. Weston A. Price, which were published in 1939. While practicing dentistry, he observed that the number of patients that he was treating for dental problems was unusually high. He suspected that this trend possibly had something to do with the change in farming practices. This led him to travel the world, so that he could document differences in health between individuals living in communities unaffected by modern industrialized farming and those living in the western world. Surprisingly, Dr. Price observed that despite a lack of dental hygiene practices in many of these isolated communities, tooth decay was virtually non-existent. Additionally, various bone deformities, developmental disorders, chronic conditions and other disease states were less likely to occur in the populations of individuals that have not been exposed to modern farming practices.

| Vitamin K2 Containing Foods (in order of Vitamin K2 content) |
|--|
| -Natto (Japanese fermented soy product) |
| -Organ meats (goose liver, chicken liver, calf liver) |
| -Hard cheeses (gouda) |
| -Soft cheeses (brie, blue cheese) |
| -Eggs |
| -Butterfat from milk |
| -Meat (beef, chicken, fish, etc.) |
| -Natto contains significantly more vitamin K2 than any other food product (1,103.4 micrograms in a 3.5 oz. serving; 90% as MK-7 and 10% as MK-4) |
| -Products from grass fed animals will contain higher levels of vitamin K2 |

| Student Pharmacist Comments |
|--|
| Vitamin K2 supplements may promote general health and well-being, including bone health, dental health and heart health. |
| Further studies are needed to establish the use of vitamin K2 supplements in the treatment or prevention of disease. ^{2,3} Speak with your healthcare provider, prior to making any changes to your prescribed medications. |
| If you are experiencing any unusual symptoms that you suspect may be due to a vitamin deficiency or a disease state, contact your healthcare provider. |
| If you are currently on a blood thinner medication such as Coumadin® (warfarin), speak with your healthcare provider before taking any vitamin K containing supplements.⁴ |

References:

1. Rheaume-Bleue K. *Vitamin K2 and the Calcium Paradox*. Reprint. New York: Harper; 2013.
2. Higdon J, Drake V, Delage B. *Vitamin K*. In Booth S, ed. Linus Pauling Institute: Micronutrient Information Center Website. <http://lpi.oregonstate.edu/mic/vitamins/vitamin-K>. Updated 2014. Accessed January 24, 2018.
3. Palermo A, Tuccinardi D, D'Onofrio L, et al. Vitamin K and osteoporosis: Myth or reality? *Metabolism*. 2017 May; 70:57-71. Doi: 10.1016/j.metabol.2017.01.032. Epub 2017 Feb 4.
4. Theuwissen E, Teunissen KJ, Spronk HM, et al. Effect of low-dose supplements of menaquinone-7 (vitamin K2) on the stability of oral anticoagulant treatment: dose-response relationship in healthy volunteers. *J Thromb Haemost*. 2013 Jun;11(6):1085-92. doi: 10.1111/jth.12203.