K-FORCE MAX

Ortho Molecular Products®
Because Efficacy Matters®



CLINICAL APPLICATIONS

- *Supports Healthy Calcium Balance*
- *Promotes Optimal Bone Health*
- *Supports Cardiovascular Health and Arterial Elasticity*
- *Boosts Immune Function*

ESSENTIAL VITAMINS

Emerging research highlights the importance of optimal vitamin K intake due to its critical role in maintaining bone and cardiovascular health. Composed of a group of naturally occurring and structurally similar, fat-soluble vitamins, vitamin K is required for the proper utilization of calcium and helps to bind newly absorbed calcium to the bone matrix. Vitamin K helps maintain bone mineral density by decreasing the activity of osteoclasts, cells which break down bone.[1] It also provides critical cardiovascular protection by activating matrix Gla protein (MGP), a potent inhibitor of circulatory calcification.[2,3] Vitamin K and vitamin D, another key nutrient required for overall wellness, act in synergy to support and maintain bone and cardiovascular health. Current research has found high-concentration supplementation, at 180 mcg/day, results in improved clinical results compared to lower-dose supplementation.[4] K-FORCE MAX provides 180 mcg of MenaQ7® PRO, the most widely studied form of vitamin K2 as MK-7, along with 10,000 IU of vitamin D3 for optimal support of bone and cardiovascular health.

Overview

Calcium and vitamin D are important mediators in bone growth, but vitamin K plays an equally important role. The synthesis of bone growth is dependent on vitamin K through its carboxylation of osteocalcin, a protein secreted by osteoblasts.[5] Osteocalcin guides calcium into bones and prevents its absorption into organs, joint spaces and arteries. Vitamin K occurs in two main forms: K1 (phylloquinone), found primarily in the liver, naturally occurs in green leafy vegetables and is considered to be the main dietary source; and K2 (menaquinone), which is a group of related compounds differentiated by their side chains.[6] MK-4 and MK-7 are the two subclasses of K2 most widely studied for their role in bone and cardiovascular health. MK-4 is primarily a metabolic byproduct of K1 while MK-7 is found in small quantities in liver mitochondria and other tissues.[7] The MK-7 form is substantially more active, has a longer half-life and accumulates to higher concentrations in serum than vitamin K1.[8,9] The different degrees of bioavailability between K1 and K2 are due to differences in structure. The long side-chain of vitamin K2 (specifically MK-7) allows it to bind with fat particles in circulation. This process then allows easier facilitation to soft tissue, bones and arteries. More recently, research has shown that doses of 180 mcg of MK-7 provide greater results when supporting both bone and cardiovascular health.[4]

The addition of MenaQ7® PRO to this formula is backed by extensive research. With his team of research scientists, Dr. Leon Schurgers, a world-renowned expert in vitamin K2 as MK-7 research for cardiovascular and bone health, has conducted over 21 clinical trials on MenaQ7® PRO through the University of Maastricht.

Vitamin K Depletion†

Although most people consume adequate dietary amounts of vitamin K to maintain sufficient blood clotting, most do not consume enough MK-7 to meet cardiovascular and bone health needs. In fact, approximately 70% of the Western-world population is deficient in vitamin K2. Compromised intestinal

† These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

eFFICACY the power of e

absorption can also lead to insufficient K2 levels, leaving calcium available to be exported out of bone and into other tissues. Other medications, such as antibiotics, cholesterol-lowering medications and laxatives, have also been found to contribute to a deficiency of vitamin K.[10,11]

Bone Health†

Supplementation of K2 has repeatedly been shown to help maintain bone density and strength among women.[10] Research from Japanese populations has found superior bone health among women who more frequently consumed MK-7-rich nattō than those who did not.[12] The positive effect of K2 on bone health is also evident in healthy children, among whom modest supplementation with MK-7 has been shown to increase osteocalcin carboxylation.[9] In a randomized, placebo-controlled trial, 180 mcg of MK-7 or placebo was given to 244 healthy post-menopausal women over three years. After at least two years, statistically significant benefits were seen in the vertebrae, hip and femoral neck.[13] Another ground-breaking, randomized, placebo-controlled trial gave 244 women, aged 55-65, 180 mcg of vitamin K2 or placebo. The study found that those given the K2 were significantly better able to maintain their osteoclast to osteoblast ratio. Furthermore, levels of circulating osteocalcin, a marker related to tissue calcification in the body, were reduced by 50% among women taking K2 versus a 4% *increase* among the placebo group after two and three years.[4]

Cardiovascular Health and Blood Sugar Balance†

Vitamin K also plays a key role in supporting the cardiovascular system and healthy blood sugar balance. In a large population study, those who consumed high amounts of K2 had significantly improved cardiovascular markers compared to those given vitamin K1.[2] A cohort of over 16,000 women also linked higher intake of K2 with better maintenance of cardiovascular health.[14] Studies have also shown vitamin K to support healthy blood sugar metabolism.[15,16] In a 2021 study, a cohort of 68 people received 180 mcg of vitamin K as MK-7 twice daily for 12 weeks, which showed support for cardiovascular health.[17] Another study showed that long-term (three years) supplementation of 180 mcg of vitamin K2 as MK-7 was safe and effectively maintained healthy arterial elasticity and cardiovascular function.[18,19] The same amount of MK-7 was also found to impart substantial benefits in arterial plasticity and blood vessel elasticity in healthy women, which had previously been only with "pharmacological doses" up to 4,500 mcg of synthetic vitamin K.[13]

Triage Theory

The Triage Theory states that in the face of nutrient inadequacies, nature ensures the short-term survival of a cell is protected at the expense of long-term consequences.[19,20] Vitamin K is an excellent example of this theory. Hypothetically, a short-term deficiency in vitamin K would lead to a reduction in blood clotting. This direct threat to survival does not happen, as the body uses its metabolic reserve of vitamin K to ensure immediate needs are met. If continued, this dip into reserve leads to a long-term deficiency in vitamin K. Though not directly threatening immediate survival, long-term deficiencies are linked to bone fragility, arterial calcification and genomic instability. These issues are related to a loss of vitamin K-dependent proteins not required for short-term survival, nevertheless presenting long-term health challenges.[19]

Safety and Efficacy of High Dose Vitamin D

Two well-conducted clinical trials by Heaney et al[21] and Barger-Lux et al[22] each had cohorts of healthy men and administered increasing doses of vitamin D3 for 8 and 20 weeks, respectively. Serum 25(OH)D increased significantly up to mean values of 213 nmol/L (85.2 ng/mL) and 220 nmol/L (88 ng/mL), which are values comparable to those achieved with whole-body UV light exposure.[23,24] Serum calcium was not increased, and no significant adverse effects were reported in either study. Therefore, 10,000 IU vitamin D3 intake was safe for this cohort of healthy men. Combining the results of these two studies with the absence of toxicity in normal subjects warrants a high level of confidence in the selection of 10,000 IU as the no-observed-adverse-effect level for vitamin D3 supplementation.

† These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

eFFICACY the power of e

Directions
1 capsule per day or as recommended by your health care professional.

Does Not Contain
Gluten, yeast, synthetic colors or artificial flavors.

Cautions
Do not consume this product if you are pregnant or nursing. All forms of vitamin K may interact with blood thinning medications. If you are taking such medicines, please consult your physician before taking this product.

Caution: This product is a high dose vitamin D capsule that is not typically intended for long-term daily use. Please consult your health care professional if you are unsure of the appropriate dose.

Supplement Facts V2

Serving Size 1 Capsule
Servings Per Container 30

	Amount Per Serving	% Daily Value
Vitamin D (D3 as Cholecalciferol)	250 mcg (10,000 IU)	1,250%
Vitamin K2 (as Menaquinone-7 (MK-7)) (MenaQ7®PRO)	180 mcg	*

* Daily Value not established.

Other Ingredients: Microcrystalline Cellulose, Hypromellose (Natural Vegetable Capsule), Turmeric (color), Magnesium Stearate, Silicon Dioxide and Stearic Acid.

ID# 136030 30 Capsules

MenaQ7® PRO
Vitamin K2 as MK-7

MenaQ7® PRO is a registered trademark of NattoPharma, Norway.

References

1. Weber P. Management of osteoporosis: is there a role for vitamin K? *Int J Vitam Nutr Res* 1997;67(5):350-6.
2. Geleijnse JM, Vermeer C, Grobbee DE, et al. Dietary intake of menaquinone is associated with a reduced risk of coronary heart disease: the Rotterdam Study. *J Nutr* 2004;134(11):3100-5.
3. Beulens JW, Bots ML, Atsma F, et al. High dietary menaquinone intake is associated with reduced coronary calcification. *Atherosclerosis* 2009;203(2):489-93.
4. Kidd PM. Vitamins D and K as pleiotropic nutrients: clinical importance to the skeletal and cardiovascular systems and preliminary evidence for synergy. *Altern Med Rev* 2010;15(3):199-222.
5. Plaza SM, Lamson DW. Vitamin K2 in bone metabolism and osteoporosis. *Altern Med Rev* 2005;10(1):24-35.
6. Schurgers LJ, Teunissen KJ, Hamulyák K, Knapen MH, Vik H, Vermeer C. Vitamin K-containing dietary supplements: comparison of synthetic vitamin K1 and natto-derived menaquinone. *Blood* 2007;109(8):3279-83.
7. Shearer MJ. Vitamin K metabolism and nutriture. *Blood Rev* 1992;6(2):92-104.
8. Unpublished clinical studies, NattoPharma. On file.
9. van Summeren MJ, Braam LA, Lilien MR, Schurgers LJ, Kuis W, Vermeer C. The effect of menaquinone-7 (vitamin K2) supplementation on osteocalcin carboxylation in healthy prepubertal children. *Br J Nutr* 2009;102(8):1171-1178.
10. Knapen MH, Schurgers LJ, Vermeer C. Vitamin K2 supplementation improves hip bone geometry and bone strength indices in postmenopausal women. *Osteoporos Int* 2007;18(7):963-972.
11. Ushiroyama T, Ikeda A, Ueki M. Effect of continuous combined therapy with vitamin K(2) and vitamin D(3) on bone mineral density and coagulofibrinolysis function in postmenopausal women. *Maturitas* 2002;41(3):211-221.
12. Kaneki M, Hodges SJ, Hosoi T, et al. Japanese fermented soybean food as the major determinant of the large geographic difference in circulating levels of vitamin K2: possible implications for hip-fracture risk. *Nutrition* 2001;17(4):315-321.
13. Knapen MH, Drummen NE, Smit E, Vermeer C, Theuwissen E. Three-year low-dose menaquinone-7 supplementation helps decrease bone loss in healthy postmenopausal women. *Osteoporos Int* 2013;24(9):2499-2507.

† These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

eFFICACY the power of e

14. Gast GC, de Roos NM, Slujis I, et al. A high menaquinone intake reduces the incidence of coronary heart disease. *Nutr Metab Cardiovasc Dis* 2009;19(7):504-510.

15. Beulens JW, van der A DL, Grobbee DE, Sluijs I, Spijkerman AM, van der Schouw YT. Dietary phylloquinone and menaquinones intakes and risk of type 2 diabetes. *Diabetes Care* 2010;33(8):1699-705.

16. Choi HJ, Yu J, Choi H, et al. Vitamin K2 supplementation improves insulin sensitivity via osteocalcin metabolism: a placebo-controlled trial. *Diabetes Care* 2011;34(9):e147.

17. Rahimi Sakak F, Moslehi N, Niroomand M, Mirmiran P. Glycemic control improvement in individuals with type 2 diabetes with vitamin K2 supplementation: a randomized controlled trial. *Eur J Nutr* 2021;60(5):2495-2506.

18. Theuwissen E, Smit E, Vermeer C. The role of vitamin K in soft-tissue calcification. *Adv Nutr* 2012 Mar;3(2):166-73.

19. Knapen M, Braam LA, Drummen NE, Bekers O, Hoeks A and Vermeer C. Menaquinone-7 supplementation improves arterial stiffness in healthy postmenopausal women. A double-blind randomised clinical trial. *Thromb Haemost* 2015;113(5):1135-1144.

20. Iijima H, Shinzaki S, Takehara T. The importance of vitamins D and K for the bone health and immune function in inflammatory bowel disease. *Curr Opin Clin Nutr Metab Care* 2012;15(6):635-40.

21. Heaney RP, Davies KM, Chen TC, Holick MF, Barger-Lux MJ. Human serum 25-hydroxycholecalciferol response to extended oral dosing with cholecalciferol. *Am J Clin Nutr* 2003;77(1):204-210.

22. Barger-Lux MJ, Heaney RP, Dowell S, Chen TC, Holick MF. Vitamin D and its major metabolites: serum levels after graded oral dosing in healthy men. *Osteoporos Int* 1998;8(3):222-230.

23. Stamp TC, Haddad JG, Twigg CA. Comparison of oral 25-hydroxycholecalciferol, vitamin D, and ultraviolet light as determinants of circulating 25-hydroxyvitamin D. *Lancet* 1977;1(8026):1341-1343.

24. Holick MF. Environmental factors that influence the cutaneous production of vitamin D. *Am J Clin Nutr* 1995;61(3 Suppl):638S-645S.

† These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

eFFICACY the power of e