Emulsi-D3 Synergy

designs for health®
Science first.

Pleasant tasting, naturally emulsified liquid Vitamin D3 with Vitamin K

Emulsi-D3 Synergy is a concentrated, highly bioavailable liquid vitamin D formulation (2,000 IU per drop) with 250 mcg of vitamin K1. Unlike most other liquid Vitamin D products available, Emulsi-D3 Synergy is a convenient, pleasant tasting and easily mixed formula.

A natural emulsion technology allows for the production of this formula that quickly and completely disperses in liquid. This cutting-edge technology provides enhanced bioavailability utilizing only naturally derived ingredients that are free of preservatives and synthetic surfactants.

It is widely known that vitamin D deficiency has reached epidemic proportions in the United States, and that it can manifest itself in a myriad of different ways that impact health. In addition, a large proportion of the US population is very deficient in vitamin K intake, emphasizing the importance of adequate supplementation of this critical vitamin.

Emulsi-D3 Synergy may be beneficial for:

- Heart health
- Immune support
- Osteoporosis/Osteopenia
- Healthy teeth
- Mood disorders
- Helping to reduce cancer risk or for support during cancer treatment
- UV protection
- Long-term vitamin D supplementation
- Children, the elderly, and anyone who has difficulty swallowing pills

Why include vitamin K?

Vitamin K1 was included in this formulation because it is needed to work in synergy with vitamin D, as both vitamins D and K are essential for optimal bone and arterial health and for maintaining proper immune balance. Vitamin K helps keep the important bone protein, osteocalcin, carboxylated. Undercarboxylated osteocalcin cannot regulate calcium, causing it to freely circulate in the bloodstream, and potentially be deposited in the soft tissues (calcification) such as arterial walls or kidneys.

An osteopenia study supplying K1 and D3 concluded, "Vitamin K supplementation stimulates renal calcium reabsorption, increases maturation-related cancellous bone gain, and retards the reduction in maturation-related cortical bone gain, whereas vitamin D supplementation stimulates intestinal calcium absorption and prevents the reduction in maturation-related periosteal bone gain by inducing accumulation of calcium from cancellous and endocortical bone." (*Iwamoto J, et al, Bone, 2003*)

In a study on postmenopausal women given a vitamin D supplement with minerals, these subjects showed a worsening of the elasticity of the arteries. In the other group given vitamin D with K and minerals, artery elasticity remained stable. (*Braam LA, et al, Thromb Haemost. 2004*) This is due to their interaction in the use of MGP, Matrix Gla Protein, which is a strong inhibitor of arterial calcification. The expression of MGP is D dependent and the gamma-carboxylation step which makes it active is K dependent.

Another study out of Wake Forest University, states, "hyperlipidemia, vitamin D, nicotine, and warfarin, alone or in various combinations, produce arterial calcification in animal models. MGP has recently been discovered to be an inhibitor of bone morphogenetic protein-2, the principal osteogenic growth factor. Many of the forces that induce arterial calcification may act by disrupting the essential post-translational modification of MGP, allowing BMP-2 to induce mineralization. MGP requires gamma-carboxylation before it is functional, and this process uses vitamin K as an essential cofactor. Vitamin K deficiency, drugs that act as vitamin K antagonists, and oxidant stress are forces that could prevent the formation of Gla residues on MGP." (*Wallin R, eta al, Med Res Rev. 2001*) So, do not think of just vitamin D for the bones; vitamin K is also necessary for directing the transport of calcium into bone and teeth for optimal strength.

This relationship is so important and so complimentary that Designs for Health does not recommend high dosing of vitamin D in any situation where vitamin K intake is being restricted or in cases of vitamin K deficiency unless vitamin K accompanies the vitamin D. A recent review by Dr. Parris Kidd states, "Vitamin K compounds undergo oxidation-reduction cycling within the endoplasmic reticulum membrane, donating electrons to activate specific proteins via enzymatic gamma-carboxylation of glutamate groups before being enzymatically re-reduced. **Warfarin inhibits this vitamin K reduction, necessitating K supplementation during anticoagulation therapy.**

Along with coagulation factors (II, VII, IX, X, and prothrombin), protein C and protein S, osteocalcin (OC), matrix Gla protein (MGP), periostin, Gas6, and other vitamin K-dependent (VKD) proteins support calcium homeostasis, facilitate bone mineralization, inhibit vessel wall calcification, support endothelial integrity, are involved in cell growth control and tissue renewal, and have numerous other effects. This review updates vitamin D and K skeletal and cardiovascular benefits and evidence for their synergy of action."(*Kidd, PM, Altern Med Rev, 2010)*

Supplement Facts

Serving Size 1 drop

Servings Per Container 900

Amount Per Serving		% Daily Value
Vitamin D (as Cholecalciferol)	2,000 IU	500%
Vitamin K (as Vitamin K1 Phytonadione)	250 mcg	313%

Other Ingredients: Vegetable glycerin, deionized water, lecithin (from soy).

Proof that vitamin K1 converts into vitamin K2 (MK-4)

There are those who do not believe that vitamin K1 converts adequately to vitamin K2. However, Vitamin K1 was purposely chosen for Emulsi-D3 Synergy as K1 converts into vitamin K2 in various tissues and also by intestinal bacteria, where it is absorbed as such and then stored in the liver. For this reason, when looking at vitamin K levels after oral supplementation of vitamin K1, proper research must actually look for vitamin K2 in the body. The body regulates its own needs for the other forms of vitamin K.

Research on vitamin K2 proves that K2 has the vascular and cardiovascular modulating effects. You can be confident that when you give K1, the patient is getting K2 (MK-4), as the following studies prove that this conversion of K1 to K2 does occur.

Menaquinone-4 in breast milk is derived from dietary phylloquinone.

A study on lactating women found that after giving vitamin K1 supplementation for 12 days, both vitamin K1 and vitamin K2 (MK-4) levels in breast milk increased, dose dependently. (*Thijssen HH, et al, Br J Nutr. 2002*)

Intestinal flora is not an intermediate in the phylloquinone-menaquinone-4 conversion in the rat.

This animal study, which investigated the tissue distribution of vitamin K, revealed, "The MK-4 tissue distribution pattern after phylloquinone intake was comparable with that found after menadione intake. Our results demonstrate that **the conversion of phylloquinone into MK-4 in extrahepatic tissues may occur in the absence of an intestinal bacterial population** and is tissue specific." (*Ronden JE, et al, Biochim. Biophys. Acta. 1998*)

Vitamin K distribution in rat tissues: dietary phylloquinone is a source of tissue menaquinone-4.

A third study looked at the effects of feeding rats a vitamin K-free diet followed by supplementation with vitamin K1, both orally and by IV infusion. Here, **levels of vitamin K2 (MK-4) increased in all tissues**, including the brain, pancreas and liver. (*Thijssen HH, Br J Nutr. 1994*)

Recommended Use:

Emulsi-D3 Synergy can be dropped into any beverage or simply on the tongue. The convenient 1oz. squeeze bottle makes dosing very simple and accurate, offering a broad range of dosages and titration possibilities.

References

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