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OsteoForce™ is a unique blend of highly absorbable vitamins and minerals formulated to support healthy bones.* This formula features calcium and magnesium that are bound to malic acid for enhanced absorption, along with chelated forms of zinc, copper, and manganese for superior bioavailability.*

Ingredient Highlights

- 2:1 calcium-to-magnesium ratio — optimal ratio for mineral balance
- 1,000 IU (25 mcg) of vitamin D to support bone health and optimal calcium and magnesium activity*
- 1,000 mcg of vitamin K1 and 50 mcg of vitamin K2 (as MK-4) to support complete activation (carboxylation) of osteocalcin, the protein that deposits calcium in the bone
- 5 mg of geranylgeraniol to support the conversion of vitamin K1 to K2 (as MK-4)
- 50 mg of vitamin E delta- and gamma-tocotrienols (as DeltaGold®) to support a healthy inflammatory response and bone health*
- Chelated minerals for enhanced absorption and bioavailability and reduced gastrointestinal complaints

Vitamin D plays an important role in calcium homeostasis and bone health as part of its activity in the body. The bioactive form of vitamin D [1,25-dihydroxyvitamin D or 1,25(OH)2D] supports the mobilization of calcium from bone when intestinal calcium absorption decreases to maintain calcium homeostasis. Vitamin D receptors increase calcium absorption in the intestines, regulate bone resorption, and mediate active reabsorption of calcium in the kidneys.¹⁻⁴

Vitamin D may have a direct effect on bone health by regulating the proliferation, differentiation, and maturation of osteoblasts and osteoclasts. It may also regulate bone mineralization and bone formation by upregulating gene expression for encoding type 1 collagen, osteocalcin, and osteopontin.²⁻⁴

Deficiency of vitamin D is associated with an increased risk of rickets, osteomalacia, osteopenia, and osteoporosis.⁵ A meta-analysis of 11 observational studies found an association between an increase of 25 nmol/L of 25-hydroxyvitamin D [25-(OH)D] concentration and an adjusted relative risk of 0.93 for any fracture and 0.80 for hip fractures.⁶ Clinical studies have found that vitamin D supplementation supports bone health in individuals with a 25-OHD of <30 nmol/L.⁷

Calcium (as DimaCal® Di-Calcium Malate, Calcium Ascorbate): Calcium and other mineral components strengthen bones and hard tissues. After osteoblasts build the base, bone is mineralized when there are normal levels of calcium and phosphate and no inhibitors. Although 99% of calcium in the body exists in the bone as the main structural mineral, the other 1% is tightly controlled to ensure availability for key physiological processes. When dietary levels of calcium are insufficient to maintain calcium homeostasis, calcium is taken from the bone. Studies have found that maintaining normocalcemia has priority over maintaining bone structure and health.^{1,8,9}

Studies on Calcium Plus Vitamin D Supplementation: Studies demonstrate a more effective result with combined calcium and vitamin D supplementation. Meta-analyses found that combined supplementation with vitamin D and calcium was associated with a 6% to 15% reduction of risk of any fracture and 16% to 30% reduced risk of hip fractures.^{6,10} A Cochrane systematic review determined that there is a high quality of evidence for vitamin D plus calcium supplements to reduce the risk of hip fractures.

The research also found a statistically significant reduction in the incidence of new nonvertebral fractures and a reduced risk of any type of fracture.¹¹ Vitamin D and calcium supplementation may also support fracture healing and post-traumatic bone turnover.¹²

Benefits*

- Supports normal bone density
- Supports bone health and integrity

Supplement Facts

Serving Size 4 capsules
Servings Per Container 30

Amount Per Serving		% Daily Value
Vitamin C (as Calcium Ascorbate)	100 mg	111%
Vitamin D (as Cholecalciferol)	25 mcg (1000 IU)	125%
Vitamin K (as Vitamin K1 Phytonadione, Vitamin K2 Menaquinone-4)	1050 mcg	875%
Calcium (as DimaCal® Di-Calcium Malate, Calcium Ascorbate)	500 mg	38%
Magnesium (as Di-Magnesium Malate)	200 mg	48%
Zinc (as Zinc Bisglycinate Chelate)	5 mg	45%
Copper (as TRAACS® Copper Bisglycinate Chelate)	1 mg	111%
Manganese (as TRAACS® Manganese Bisglycinate Chelate)	2 mg	87%
Vitamin E Isomers (as DeltaGold® delta and gamma tocotrienols)	50 mg	*
Trans-Geranylgeraniol (GG-Gold®)	5 mg	*
Boron (as Bororganic Glycine)	4 mg	*

*Daily Value not established.

Other Ingredients: Cellulose (capsule), microcrystalline cellulose, vegetable stearate.

Magnesium (as Di-Magnesium Malate): Approximately 50% to 60% of the total body magnesium content is stored in the bones, where magnesium ions improve the solubility of phosphorus and calcium hydroxyapatite and influence crystal size and formation. Magnesium also induces the proliferation of osteoblasts.¹³ Magnesium deficiency is associated with a decrease in osteoblastic and osteoclastic activity, bone fragility, and osteopenia. Low dietary magnesium intake was found to be associated with a significant decrease of bone mineral density of the hip and whole body, along with T scores.¹⁴⁻¹⁷

There is an important relationship between magnesium and vitamin D. Magnesium is required for the enzymes involved in vitamin D metabolism and activation, including the key enzymes 25-hydroxylase and renal 1-alpha-hydroxylase. Magnesium deficiency reduces the levels of active vitamin D, and magnesium supplementation optimizes vitamin D levels. Vitamin D increases absorption of magnesium.¹⁸⁻²⁰

Calcium and magnesium also have an important relationship, with an optimal ratio of 2:1. When calcium levels are low, magnesium deficiency reduces parathyroid hormone (PTH) secretion. Restoring magnesium levels can support increasing calcium levels and PTH without requiring additional calcium. Magnesium deficiency is associated with excess calcium released from bone, which may impact bone health and the risk of osteoporosis.¹⁸

Vitamin K and Geranylgeraniol (GG): Vitamins K1 and K2 activate osteocalcin (Oc), which should be maximally carboxylated so that Oc binds calcium (Ca) and transports it inside bones and teeth. Ninety percent of vitamin K is deposited in the tissues in the form of vitamin K2 (as MK-4), with the rest mostly as K1.²¹ The adequate intake (AI) for vitamin K1 of 120 mcg for men and 90 mcg for women can only support blood-clotting proteins, but more is needed for the extra-hepatic roles of vitamins K, which include the control of Ca transport between tissues.²² Vitamin K1 is deposited as phylloquinone and partially converted to vitamin K2 (as MK-4), with the aid of geranylgeraniol pyrophosphate (GG-PP), a metabolic intermediate synthesized in the mevalonate pathway.^{21,22} Vitamin K2 (as MK-4) has unique genetic and metabolic effects in human physiology, which are believed to be due to its GG component. GG may be supplemented from plant extracts and is converted to GG-PP in human physiology.²²

In clinical studies, a dose of 1 mg of vitamin K1 increased the percentage of carboxylated osteocalcin to >95%.²³⁻²⁵ Vitamins D and K have a synergistic relationship, including their support of bone health. A meta-analysis found that supplementing with a combination of vitamin D and K (especially K2) significantly increased total bone mineral density and significantly decreased undercarboxylated osteocalcin.²⁶ Vitamin K also supports the activities of calcium and magnesium on bone health. One clinical study found that a dose of 0.1 mg of vitamin K1 resulted in a 1.3% increase in bone density for menopausal individuals when supplemented along with vitamin D, calcium, and magnesium.²⁵ The dose of vitamin K2 (as MK-4) at 50 mcg in OsteoForce™ falls in the middle range of average vitamin K2 intakes (12 mcg to 128 mcg per day) in a modern population.²¹

Vitamin C: Vitamin C suppresses osteoclast activity, acts as a cofactor for osteoblast differentiation, and participates in collagen formation.¹³ Meta-analyses have found that a higher intake of vitamin C is associated with a 33% lower risk of osteoporosis and a lower risk of hip fractures with higher bone mineral density at the femoral neck and lumbar spine, as there is a dose-dependent relationship.^{27,28}

Additional Nutrients

OsteoForce™ includes additional nutrients and compounds to support bone health.* Zinc increases osteoblast activity, promotes collagen synthesis, activates bone formation, and inhibits osteoclastic bone resorption.²⁹ Copper is an enzyme cofactor, including activating lysyl oxidase to induce lysine crosslink formation in collagen and elastin. Additionally, it supports the maintenance of the bone matrix.²⁹ Manganese supports bone matrix synthesis and calcification.²⁹ Boron supports calcium metabolism, bone growth, bone remodeling and maintenance, and increases levels of 25-hydroxyvitamin D3.²⁹ Vitamin E isomers (as DeltaGold® delta- and gamma-tocotrienols) support a healthy inflammatory response to support bone health.*³⁰

Recommended Use: Take 4 capsules daily or as recommended by your health-care practitioner.

Warning: Consult your health-care practitioner before using this product if you are taking Coumadin, warfarin, or other anticoagulant medications.

For a list of references cited in this document, please visit:

<https://www.designsforhealth.com/api/library-assets/literature-reference---osteoforce-tech-sheet-references>

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*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.

To contact Designs for Health, please call us at (860) 623-6314, or visit us on the web at www.designsforhealth.com.

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