Calcium Bone Maker Complex®

INGREDIENTS
Bone is dynamic living tissue, and like the body's other tissues it requires nutrients for maintenance, renewal, and repair. Calcium Bone Maker® Complex is a dietary supplement that delivers key bone nutrients in their most bioactive forms. This comprehensive bone maintenance formula supplies microcrystalline hydroxyapatite, a rich source of bone building nutrients. It also supplies vitamins C, D and K and the essential minerals magnesium, potassium, zinc, copper, manganese, and boron, all fundamental to bone health.

Scientifically Advanced Bone Health Maintenance*
Among this product's unique features:
• Broad nutrient spectrum to promote healthy bone maintenance.*
• Generous allowance of vitamin D to effectively keep bones strong.*
• Designed to promote bone matrix formation, a requisite for calcium utilization.*
• Supplies highly bioactive vitamin K2 (as MK-7) to assist bone calcium management.
• Provides optimized allowances of calcium, magnesium, and other essential bone minerals.
• Avoids technical shortcuts that use magnesium oxide or other poorly absorbed ingredients.
• Offers potential benefits that extend beyond bone to promote overall health and wellbeing.*

To develop this formula the Doctor's Best team conducted extensive research into bone biology. As always, we chose the purest and best-absorbed nutrient ingredients to guarantee its safety and efficacy. This formula also was carefully designed to avoid supplying far more calcium than the body can utilize, as currently occurs with many calcium supplements. High calcium supplement intakes have potential to cause major adverse health effects.1,2

Bone Health Requires Multiple Nutrient Inputs
The popular literature would have us believe that by taking calcium supplements we can keep our bones strong into old age. But the medical literature tells a different story: calcium taken by itself does not reliably conserve bone mineral density.3,4 Rather, the clinical research indicates bone integrity is better conserved by supplementing with other minerals and nutrients in addition to calcium.5

Calcium Mineralization Of Bone Requires A Preformed Matrix. Fully formed bone is a connective tissue matrix infiltrated with microscopic calcium hydroxyapatite crystals that confer bulking and considerable mechanical strength.6 The process of calcium deposition can occur only where a bone matrix is in place to “accept” it. Bone matrix is analogous to a grid of steel bars over which concrete is poured—without these “rebars” the poured concrete will be flawed and vulnerable to fracturing under mechanical strain.

The bone matrix structure is primarily a web of large, fibrous collagen molecules, interspersed with smaller amounts of other proteins and glycosaminoglycans (protein-carbohydrate complexes).6 Calcium Bone Maker® Complex supplies a very similarly composed, semi-assembled collagen web, in the form of ossein microcrystalline hydroxyapatite complex. This organically prepared bone extract includes collagen and the other bone matrix proteins, along with bone growth factors (small proteins that enhance bone growth and renewal), highly bioavailable calcium, and other mineral building blocks for the bone matrix.

Zinc, Copper, Manganese, Boron Build Bone Matrix. This formula also provides additional, generous daily amounts of the trace minerals involved in bone matrix formation. Zinc is broadly required for the transcription (“reading out”) of DNA to RNA, and for the translation of RNA into new bone proteins.7 Copper is an essential cofactor for the enzyme that helps crosslink collagen into the forming matrix.8 Manganese is required by enzymes that make matrix glycoproteins.9 In a two-year, double-blind, placebo-controlled clinical trial with post-menopausal women, a combination of calcium with zinc, copper and manganese thoroughly enhanced bone health.7

Supplement Facts
<table>
<thead>
<tr>
<th>Serving Size</th>
<th>6 capsules</th>
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<tbody>
<tr>
<td>Servings per container</td>
<td>30 servings</td>
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<table>
<thead>
<tr>
<th>Mineral</th>
<th>Amount per serving</th>
<th>% Daily Value</th>
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<tbody>
<tr>
<td>Potassium (from potassium citrate)</td>
<td>99 mg</td>
<td>3%</td>
</tr>
<tr>
<td>Vitamin C (as ascorbic acid)</td>
<td>250 mg</td>
<td>417%</td>
</tr>
<tr>
<td>Calcium (from microcrystalline hydroxyapatite)</td>
<td>600 mg</td>
<td>60%</td>
</tr>
<tr>
<td>Vitamin D (as D3, cholecalciferol)</td>
<td>1800 IU</td>
<td>450%</td>
</tr>
<tr>
<td>Vitamin K (as K2, MK-7/menaquinone-7)</td>
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<td>99%</td>
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<tr>
<td>Magnesium (from dimagnesium malate)</td>
<td>300 mg</td>
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</tr>
<tr>
<td>Zinc (from zinc monomethionine)</td>
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<tr>
<td>Copper (from copper gluconate)</td>
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<tr>
<td>Manganese (from manganese citrate)</td>
<td>2 mg</td>
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</tr>
<tr>
<td>Microcrystalline hydroxyapatite</td>
<td>2727 mg</td>
<td>+</td>
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<tr>
<td>Boron (from boron citrate)</td>
<td>4 mg</td>
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</tr>
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† Daily Value not established.

Other Ingredients: Rice flour, magnesium stearate, gelatin (capsule).
Suggested Adult Use: Take 6 capsules daily, in divided doses after meals. For best results, use in conjunction with Doctor's Best Strontium Bone Maker® but separated by at least 2 hours as strontium and calcium may compete for absorption.

* 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.
Boron has shown benefits for bone health in laboratory animals, and studies with post-menopausal women suggest it contributes to calcium and magnesium metabolism. Experiments with cultured human cells suggest boron can stimulate bone protein growth factors that support bone mineralization.

Potassium has a positive but incompletely understood role in bone maintenance. Potassium supplementation was shown to reduce urine calcium loss and promote bone mineral density.

**New Understanding of Calcium and Bone Health**

**Calcium Utilization Requires Vitamin D.** Clinically, it is now clear that taking calcium supplements without having sufficient vitamin D in the blood will not enhance bone health. Vitamin D3 made in the skin is converted into a circulating master hormone that broadly controls calcium utilization. Vitamin D3 sufficiency also improves calcium absorption.

Taking calcium supplements without vitamin D may be dangerous. A 2010 ‘meta-analysis’ reanalyzed the pooled data on calcium supplement use from 11 double blind clinical trials that involved more than 6000 subjects. It concluded that taking calcium supplements at intakes higher than 700 mg per day is at odds with maintaining cardiovascular health. Other meta-analyses concluded that supplementing calcium without vitamin D may be counterproductive in trying to maintain bone health.

**Scientific Reappraisals Suggest Lower Calcium Requirements.** Metabolic balance studies are expensive and tedious for the subjects and the researchers, but are the most precise means for measuring nutrient requirements. Typically, healthy volunteer subjects are confined in a metabolic ward and receive their entire dietary intake, including liquids, from one carefully controlled dietetic kitchen for up to three weeks. In the metabolic ward all excreta and secretions (even sweat) are collected so that the entire metabolic economy of the nutrient can be quantified. Sometimes radiolabeled isotopes are used to directly trace the nutrient’s absorption. Numerous such calcium balance studies have been conducted.

The data from the calcium balance studies suggest 700-750 mg per day, for the TOTAL ongoing intake of calcium necessary to maintain positive calcium balance (excess calcium retained in the body over the calcium lost via excretion and sweating). Calcium intakes from food are minimally several hundred milligrams per day. Calcium Bone Maker® Complex supplies 600 mg calcium per day, as the highly bioavailable microcrystalline hydroxyapatite.

Similar calculations of magnesium requirements from balance studies have pegged its minimum requirement at around 400 mg per day. Magnesium intakes from food are approximately 250-300 mg per day. This formula supplies 300 mg per day of magnesium, and conforms to the widely recommended dietary ‘calcium-magnesium ratio’ of 2 to 1 calcium: magnesium.

**Magnesium, Calcium’s Metabolic Partner.** This mineral is required for more than 300 enzyme systems. It is essential for cells to make energy, to synthesize proteins for tissue growth and renewal, as well as for numerous other essential functions. Magnesium deficiency is widespread in North America, likely making it more difficult for the general population to maintain optimal cardiovascular health. Magnesium metabolism is also very tightly linked with calcium metabolism.

Similarly, some 50–60% of the body’s magnesium is located in bone, and this mineral has a ‘yin-yang’ relationship with calcium: it both facilitates and counterbalances calcium’s biochemical actions. Magnesium insufficiency (negative magnesium balance) can quickly lead to abnormal lowering of calcium in the blood. This formula provides the dimagnesium malate, which drives far more magnesium into the blood than does magnesium oxide. The malate portion can enter the citric acid/Krebs metabolic cycle to help the bone (and other) cells generate energy.

The oxide form of magnesium is widely used in dietary supplement formulas, but its magnesium content is very poorly absorbed, thereby depriving the consumer of this precious essential nutrient.

**The Vitamin D—Vitamin K—Calcium Synergy**

**Vitamin D, Essential to Bone Maintenance.** Vitamin D deficiency, or even the less severe insufficiency state, is a major public health problem worldwide. The evidence that vitamin D sufficiency contributes to bone strength has become overwhelming. There is now consensus among the experts that older adults should receive supplemental vitamin D to maintain bone health.

Clinical trials have established a solid relationship between increased blood vitamin D levels and maintenance of healthy bone structure—higher blood vitamin D also helps preserve muscle tone. Therefore Calcium Bone Maker® Complex supplies a generous 1800 International Units of cholecalciferol (vitamin D3), the most biologically active vitamin D, per serving.

**Vitamin K, Telling Calcium Where to Go.** Traditionally considered essential for the clotting proteins, vitamin K is now also recognized as essential for appropriate distribution of calcium throughout the tissues. This vitamin helps assure calcium is deposited only where it belongs (bone and other hard tissues) rather than where it doesn’t belong in the body.

Vitamin K is the essential metabolic activator for a family of proteins that tightly bind calcium—ostecalcin, matrix Gla protein, perilostin, and others, that hold as many as 16 calcium atoms per protein molecule. The vitamin K2 forms are markedly more active than vitamins K1 or K3, and this formula supplies MK-7 (menaquinone-7), a very well absorbed form of K2. Higher intakes of vitamin K2 are associated with superior cardiovascular health.

**Osteocalcin—Where Vitamins D and K Meet.** Osteocalcin is the second most abundant bone protein after collagen, and is crucial to the normal bone matrix calcification process. When vitamin K is deficient this protein is less able to attract calcium into the bone matrix. Therefore Calcium Bone Maker® Complex provides generous allowances of both vitamin D3 and vitamin K2.

Though the metabolic actions of vitamin D and K meet at osteocalcin, they also overlap in other life processes. In cultured bone building cells (osteoblasts) D and K mutually enhance each other’s metabolism, which suggests they operate in a true synergy at the biochemical level.

**Comprehensive Support for Bone Maintenance and Overall Health**

Bone maintenance involves biological processes that continually recycle the bone fabric, removing defective bone zones and replacing them with newly calcified matrix. This formula supplies nutrients proven effective, safe and well-tolerated for bone maintenance. This formula is available as capsules (6 per day), to be taken after meals and preferably in divided doses. This supplement is not suitable for vegetarians.

**Calcium Bone Maker® Complex** was formulated to complement Strontium Bone Maker from Doctor’s Best. Calcium and strontium have their own ‘yin-yang’ relationship in strengthening bone, though the two formulas must be taken at least two hours separate from each other as they may compete for absorption.

Bone health can be nurtured by using these science-based dietary supplements, exercising regularly, managing body weight, consuming healthy foods, avoiding soda drinks (with phosphoric acid that depletes minerals from the body), and generally pursuing a healthy lifestyle. The

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range of biochemically potent nutrients in Calcium Bone Maker® Complex also promote whole-body health and wellbeing.

**SCIENTIFIC REFERENCES**


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