



More than 10 million Americans have the bone-weakening disease osteoporosis—approximately 15 percent of women and 4 percent of men over the age of 50. Another 34 million or so have osteopenia—below-normal bone density that may lead to osteoporosis. And every year, 2 million people with osteoporosis have a so-called osteoporotic fracture, usually of the hip, spine, or wrist. ▶▶▶

Measuring the Threat

When osteoporotic fracture occurs in the hip or spine, the results can be devastating. Those suffering from hip fracture often tend to become depressed and sedentary. But worse, when Australian researchers in an 18-year study looked at more than 4,000 people age 60 and older, they found that almost any kind of osteoporotic fracture increased mortality risk.

Assessing your risk is the place to start if osteoporosis seems likely.

A dual energy x-ray absorptiometry (DEXA) test measures bone mineral density (BMD). A score of -1 to -2.5 indicates osteopenia. A score under -2.5 signals osteoporosis. However, BMD is not a crystal ball. It predicts only around 44 percent of fractures in elderly women, for example.

The BMD test indicates the hardness of bone, imparted by key minerals. That's why experts suggest supplementing with calcium, magnesium, and trace minerals. But flexibility is also important. The ability to bend a bit and not break is what helps bones resist fracture.

What's in Your Bone Health Supplement?

Bone health supplements contain many different ingredients. Besides **calcium** and **vitamin D** (both vital), many include **vitamin K**, **boron**, **magnesium**, and **soy isoflavones**. Do any of these help build bone and reduce fracture risk? What's the evidence?

Flexibility is created by the bone's collagen, its protein-rich infrastructure. To build bone collagen, you need vitamin K. MK4 and MK7 are two types of **vitamin K2** that are available in dietary supplements. Of these two, only MK4 (also known as menatetrenone, or menaquinone-4) appears to decrease fracture risk. Multiple clinical trials using 45 milligrams (mg) per day of MK4 show that this dosage may help prevent some fractures. Doctors in England analyzed the data from 13 studies on bone loss and vitamin K. They found that vitamin K helped reduce bone loss, while MK4, in particular, decreased the incidence of hip fractures by 77 percent and spinal fractures by 60 percent. Compare those results to an average 16 percent decrease in fracture risk from taking supplemental calcium and vitamin D (which aids in the absorption of calcium) alone!

MK4 is understood to be safe and useful for promoting bone health when 45 mg are taken daily with calcium and vitamin D. One note of caution, however: If you are taking the anticoagulant warfarin (Coumadin), talk to your doctor before taking any type of supplemental vitamin K, which can block the action of the drug.

Boron, a trace mineral naturally present in the environment, is healthful for humans in small amounts. Studies have shown that taking 3 mg of boron daily reduces urinary excretion of calcium and magnesium, especially when dietary

To stay healthy,
bones must be
both hard *and*
flexible. Certain
supplements
can help.

intake of magnesium is low. Boron supplementation also elevates blood levels of the hormones 17 beta estradiol and testosterone. This evidence suggests that boron may promote bone health. However, no clinical trials have shown that boron specifically improves bone mineral density, decreases bone loss, or decreases frequency of fractures.

Magnesium plays a role in promoting bone health by balancing calcium levels and supporting calcium metabolism.

Human studies indicate that supplementing with magnesium helps improve bone mineral density. And a small trial in Turkey recently showed that 30 days of magnesium citrate supplementation suppressed bone turnover in older women with osteoporosis. Since about 56 percent of adults do not consume even the minimum recommended daily allowance of magnesium, it makes sense to supplement the diet with a highly absorbable form of this mineral.

The term **soy isoflavones** refers to multiple naturally occurring chemicals called phytoestrogens. As the name implies, these molecules have estrogenic activity. Though estrogen supplementation has been approved by the U.S. Food and Drug Administration as an osteoporosis treatment, the dangerous side effects associated with hormone replacement therapy (HRT) have made many women—and their healthcare providers—reconsider. As a natural alternative, soy isoflavones have been studied for their bone-building effects. However, observational studies and clinical trials have not yet shown consistent evidence that soy isoflavones build stronger bones.✿

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“**Bone Mineral Density Thresholds for Pharmacological Intervention to Prevent Fractures**” by E. S. Siris et al., *Arch Intern Med*, 5/04 • “**Effect of Continuous Combined Therapy with Vitamin K2 and Vitamin D3 on Bone Mineral Density and Coagulofibrinolysis Function in Postmenopausal Women**” by T. Ushiroyama et al., *Maturitas*, 3/02 • “**Incidence and Economic Burden of Osteoporosis-Related Fractures in the United States, 2005–2025**” by R. Burge et al., *J Bone Miner Res*, 3/07 • “**Low Micronutrient Intake May Accelerate the Degenerative Diseases of Aging Through Allocation of Scarce Micronutrients by Triage**” by B. N. Ames, *Proc Natl Acad Sci USA*, 11/06 • “**Menatetrenone and Vitamin D2 with Calcium Supplements Prevent Nonvertebral Fracture in Elderly Women with Alzheimer’s Disease**” by Y. Sato et al., *Bone*, 1/05 • “**Mortality Risk Associated with Low-Trauma Osteoporotic Fracture and Subsequent Fracture in Men and Women**” by D. Bliuc et al., *JAMA*, 2/09 • “**Natural Health Products in the Prevention and Treatment of Osteoporosis: Systematic Review of Randomized Controlled Trials**” by A. M. Whelan et al., *Ann Pharmacother*, 5/06 • “**Short-term Oral Magnesium Supplementation Suppresses Bone Turnover in Postmenopausal Osteoporotic Women**” by H. Aydin et al., *Biol Trace Elem Res*, 2/10 • “**Vitamin D and Calcium Supplementation Prevents Osteoporotic Fractures in Elderly Community Dwelling Residents**” by E. R. Larsen et al., *J Bone Miner Res*, 3/04 • “**Vitamin K2 in Bone Metabolism and Osteoporosis**” by S. M. Plaza and D. W. Lamson, *Altern Med Rev*, 3/05 • “**Vitamin K and the Prevention of Fractures: A Systematic Review and Meta-Analysis of Randomized Controlled Trials**” by S. Cockayne et al., *Arch Intern Med*, 6/06