Osteoporosis

People with osteoporosis have brittle bones, which increases the risk of bone fracture, particularly in the hip, spine, and wrist. Although the risk of becoming osteoporotic is tied to many dietary and lifestyle issues, the true cause of this condition remains somewhat unclear. Osteoporosis is most common in postmenopausal Oriental and white women. Premenopausal women are partially protected against bone loss by the hormone estrogen. Black women often have slightly greater bone mass in early adulthood compared with other women, which helps protect against bone fractures even though postmenopausal black women lose bone mass just as other women do. In men, testosterone partially protects against bone loss even after middle age. Beyond issues of race, age and gender, incidence varies widely from society to society, suggesting that osteoporosis is largely preventable.

Dietary and other natural therapies that may be helpful: When over 85,000 American women were followed for twelve years, those who ate the most animal protein (meat, poultry, and dairy) had a significantly higher risk of osteoporotic fractures. Similarly, higher protein intake correlates with increased hip fracture in studies comparing different cultures. When dietary protein increases, so does the loss of calcium in urine (though this extra calcium loss is not always statistically significant). Many nutritionally oriented doctors recommend a move toward vegetarian diets for people
wishing to avoid osteoporosis or those already diagnosed with it.

However, bone formation requires protein and therefore people can eat too little protein as well as too much. In one trial of older women (average age 82) who had suffered an osteoporotic fracture, those given a 20 gram per day protein supplement had fewer complications, were less likely to die, and had much shorter hospital stays compared with women not assigned to receive extra protein.6 Similarly, in a three-year study of American women aged fifty to sixty-nine funded by the National Diary Council, those eating more animal protein had a lower risk of osteoporotic hip fracture compared with those eating less.7 A related double blind trial in older women who had recently suffered an osteoporotic hip fracture found that a 20 gram per day protein supplement reduced bone loss compared with those not receiving protein.8

Pending further research, these conflicting reports show that drawing the line between too much protein and too little remains elusive. Nonetheless, most studies currently suggest that a life-long intake of high animal protein correlates with an increased risk of osteoporosis; however, protein supplementation following a fracture in elderly people appears to result in better bone and overall health compared with no protein supplementation.

Short-term increases in dietary salt result in increased urinary calcium loss, which suggests that over time, salt intake may cause significant bone loss.9 Researchers have
shown that increasing dietary salt increases markers of bone loss in post- (though not pre-) menopausal women. Although a definitive link between salt intake and osteoporosis has yet to be proven, most nutritionally oriented doctors recommend that people wishing to protect themselves against bone loss use less salt and less highly-salted processed and restaurant foods.

Caffeine has also been linked to fracture of the hip in a large study following American women for six years. Like salt, caffeine increases urinary loss of calcium. In one trial caffeine was linked with lower bone mass but only in women who consumed relatively little calcium. The authors of this report concluded that two to three cups of coffee per day might speed bone loss in women with calcium intakes of less than 800 mg per day. Most nutritionally oriented doctors recommend decreasing caffeine intake from caffeinated coffee, black tea, and cola drinks as a way to improve bone mass.

The relationship between soft drinks and bone mass is controversial. In some reports, young cola drinkers have an increased incidence of bone fractures, though short term consumption of carbonated beverages has not affected markers of bone health. The problem, if one exists, may be linked to phosphoric acid, a substance found in many soft drinks. In one trial, children consuming at least six glasses of soft drinks containing phosphoric acid had more than five times the risk of developing low blood levels of calcium compared with other children. Avoidance of phosphoric acid-containing soft drinks has also reduced
kidney stone recurrence, again incriminating soda pop as a cause of abnormal calcium metabolism. Although a few studies have not linked soft drinks to bone loss, the preponderance of evidence now suggests that a problem may exist, and there is certainly no harm in decreasing drinks filled with sugar and chemicals, a dietary change that may reduce urinary loss of calcium.

Soy foods such as tofu, soy milk, roasted soy beans and soy extract powders may be beneficial in preventing osteoporosis. Isoflavones from soy protect animals from bone loss. Taking 40 grams of soy protein powder containing 90 mg isoflavones increased bone mineral density of the spine in a double blind trial. However, lower intakes (providing 56 mg isoflavones) did not improve bone density in this report. A synthetic isoflavone, ipriflavone, has reduced osteoporotic bone fractures in several reports. Although the use of soy in the prevention of osteoporosis looks hopeful, knowing to what extent soy reduces bone loss will require further research.

Preliminary evidence suggests that progesterone might play a role in bone metabolism that, in theory, could reduce the risk of osteoporosis. An uncontrolled preliminary study using topically-applied natural progesterone cream in combination with diet, exercise, vitamin and calcium supplementation, and estrogen therapy, reported consistent gains in bone density over a three-year period in postmenopausal women, but no comparison was made to the same protocol without progesterone. However, at least one trial has found that adding natural progesterone to
estrogen therapy does not improve the bone sparing effects of estrogen when taken alone. Because so few studies have investigated the effects of progesterone on bone mass and results from those limited reports are not consistent, the true effects of progesterone on bone mass remain unclear.

Progesterone is a hormone, and as such there are concerns about its inappropriate use. Women considering the use of natural progesterone should consult a doctor familiar with its use before using this hormone.

**Lifestyle changes that may be helpful:** Smoking leads to increased bone loss. For this and many other health reasons, smoking should be avoided.

Exercise is known to help protect against bone loss. The more weight-bearing exercise done by men and postmenopausal women, the greater their bone mass and the lower the risk of osteoporosis. Walking is sometimes considered the perfect weight-bearing exercise. For premenopausal women, exercise is also important, but taken to extreme, it can be overdone. Exercise so excessive that it leads to cessation of the menstrual cycle actually contributes to osteoporosis.

**Nutritional supplements that may be helpful:** Many trials have investigated the effects of calcium on bone mass. Although insufficient when used as the only intervention, calcium supplements have helped to prevent osteoporosis. Though some of the research remains controversial, the protective effect of calcium on bone mass
is one of very few health claims permitted by the U.S. Food and Drug Administration.

In several studies calcium intake has not correlated with protection—for example in men\textsuperscript{31} or in women shortly after becoming menopausal.\textsuperscript{32} Moreover, even most positive studies focusing on the effects of isolated calcium supplementation on bone mass show only minor effects. Nonetheless, a review of the research shows that calcium supplementation plus hormone replacement therapy is much more effective than hormone replacement therapy without calcium.\textsuperscript{33} Double blind research has found that increasing calcium intakes results in greater bone mass in girls.\textsuperscript{34} A meta-analysis of many studies investigating the effects of calcium supplementation in premenopausal women has also shown a significant positive effect.\textsuperscript{35} Most nutritionally oriented doctors, as well as most conventional medical doctors, recommend calcium supplementation as a way to partially reduce the risk of osteoporosis and to help people already diagnosed with the condition. In order to achieve the 1,500 mg per day calcium intake many researchers deem optimal, 800–1,000 mg of supplemental calcium are generally added to diets that commonly contain between 500–700 mg calcium.

Vitamin D increases calcium absorption, but surprisingly the effect of vitamin D on osteoporosis risk remains somewhat unclear,\textsuperscript{36 37} with some studies reporting little if any benefit.\textsuperscript{38} Commonly, trials reporting reduced risk of fracture have used the combination of vitamin D and calcium compared with placebo, making it impossible to
assess the specific benefit of vitamin D. Nonetheless, vitamin D does appear partially protective, at least in certain circumstances. Double blind research indicates that vitamin D supplementation reduces bone loss in women who consume insufficient amounts of vitamin D from food. A double blind trial also supports the use of higher (700 IU per day) supplemental intakes of vitamin D, particularly as a way to reduce bone loss in women during winter and spring, when vitamin D levels are typically at their lowest.

While people who get outdoors regularly and live in sunny climates are unlikely to need vitamin D supplementation (particularly during the summer), nutritionally oriented doctors generally recommend vitamin D to most other people as a way to help protect bone mass despite remaining inconsistencies in the research. Typical supplemental amounts are between 400–800 IU per day, depending upon dietary intake and exposure to sunlight.

In a preliminary study, people with osteoporosis were reported to be at high risk for magnesium malabsorption. Both bone and blood levels of magnesium have also been reported to be low in people with osteoporosis. Supplemental magnesium has reduced markers of bone loss in men. Supplementing 250 (up to 750) mg per day of magnesium has also arrested bone loss or increased bone mass in twenty-seven of thirty-one people with osteoporosis in a two-year controlled trial. As a result of this research, most nutritionally oriented doctors
recommend that people with osteoporosis supplement 250–350 mg of magnesium per day.

The idea that magnesium supplementation should be used instead of calcium remains theoretical at best. No study has yet compared the effects of calcium versus magnesium versus the combination of the two, nor has any trial uncovered the optimal ratio of calcium to magnesium for the purpose of maintaining bone mass.

Levels of zinc in both blood and bone have been reported to be low in people with osteoporosis. Urinary loss of zinc may be high in osteoporotic people according to preliminary research. In one trial, men consuming only 10 mg of zinc per day had almost twice the risk of osteoporotic fractures compared with those eating significantly more zinc from their diets. Whether zinc supplementation protects against bone loss has not yet been proven, though in one trial, combining minerals including zinc with calcium supplementation was more effective than calcium supplementation by itself. Many nutritionally oriented doctors recommend that people with osteoporosis and those trying to protect themselves from this condition supplement 10–30 mg of zinc per day.

Copper is needed for normal bone synthesis. A recent controlled two-year study reported that 3 mg of copper per day prevented bone loss. Although evaluation of the importance of copper for people with osteoporosis requires further research, many nutritionally oriented doctors recommend 2–3 mg per day, particularly if zinc is
supplemented. (Supplemental zinc significantly depletes copper nutriture, thus people taking zinc supplements for more than a few weeks generally need to supplement copper.) All minerals discussed so far—calcium, magnesium, zinc and copper—are sometimes found at appropriate levels in high potency multi-vitamin/minerals.

A preliminary trial found that supplementation with 3 mg per day of the trace mineral boron reduced urinary loss of both calcium and magnesium, but both outcomes have been contradicted by more recent research. Moreover, there is evidence that people taking magnesium supplements see no further calcium-sparing effect when adding supplemental boron. Finally, in the original report claiming that boron reduced loss of calcium, the effect was achieved by significantly increasing estrogen and testosterone levels, hormones that have been linked to cancer risks. Therefore, until evidence appears suggesting that the combination of boron plus magnesium has any advantage over magnesium supplementation without boron, it makes sense for people with osteoporosis to supplement with magnesium instead of rather than in addition to boron.

Interest in the effect of manganese and bone health began when famed basketball player Bill Walton’s repeated fractures were prevented with manganese supplementation. A subsequent unpublished trial reported manganese deficiency in a small group of osteoporotic women. Since that time, although a combination of minerals including manganese was reported to halt bone loss, no human trial has investigated the
Effect of isolated manganese supplementation on bone mass. Nonetheless, some nutritionally oriented doctors recommend 10–20 mg of manganese per day to people concerned with maintenance of bone mass.

Silicon plays a significant role in bone formation. Supplementation with silicon has increased bone formation in animal research. In preliminary human research, supplementation with silicon increased bone mineral density in a group of eight women with osteoporosis. Optimal levels remain unknown, though some multi-vitamin/mineral supplements now contain small amounts of this trace mineral.

Strontium is also believed to play a role in bone formation and preliminary evidence suggests that women with osteoporosis may have reduced absorption of this trace mineral. (The supplement considered here, sometimes called “stable strontium,” is not the dangerous radioactive form of strontium people are more familiar with.) Many years ago in a preliminary uncontrolled trial, thirty-two people with osteoporosis given 1.7 grams of stable strontium for between three months and three years reported significant reduction in bone pain, supported by x-rays suggesting an increase in bone mass. Increased bone formation and decreased bone pain were also reported in a group of six people with osteoporosis given 600–700 mg of stable strontium per day. Although levels used in preliminary research have been quite high, optimal intakes remain unknown. Some nutritionally oriented doctors recommend a few milligrams per day (1–3 mg)—less than
many people currently consume from their diets, but an amount that has begun to appear in some mineral formulas geared toward bone health.

Folic acid, vitamin B6, and vitamin B12 are known to reduce blood levels of the amino acid homocysteine in the body, while homocysteinuria, a condition associated with high homocysteine levels, frequently causes osteoporosis. Although some doctors of natural medicine have suggested these B vitamins might help prevent osteoporosis by lowering homocysteine, no research has yet explored this relationship. For the purpose of lowering homocysteine, amounts of folic acid and vitamins B6 and B12 found in high-potency B-complex supplements and multi-vitamins should be adequate.

Vitamin K is needed for bone formation. Those with osteoporosis have been reported to have both low blood levels and low dietary levels of vitamin K. One study found that post- (though not pre-) menopausal women have reduced urinary loss of calcium after taking 1 mg per day of vitamin K after just two weeks. In controlled trials, people with osteoporosis given large amounts of vitamin K2 (45 mg per day) showed an increase in bone density after six months and decreased bone loss after one year. In a group of eight young women, those with estrogen deficiency (but not those with a normal menstrual cycle) showed evidence of increased bone formation when given 10 mg of vitamin K per day for one month. Nutritionally oriented doctors frequently recommend 1 mg vitamin K1 to
postmenopausal women as a way to help maintain bone mass, though optimal intake remains unknown.

**Are there any side effects or interactions?** Refer to the individual supplement for information about any side effects or interactions.

**Herbs that may be helpful:** Horsetail is a rich source of silicon, and preliminary research suggests that this trace mineral may help maintain bone mass (see **Diet and Other Natural Therapies** section above). Effects of horsetail on bone mass has not yet been studied.

Black cohosh has been shown to improve bone mineral density in animals fed a low calcium diet74 but has not yet been studied for this purpose in humans.

**Are there any side effects or interactions?** Refer to the individual herb for information about any side effects or interactions.

**References:**


