Osteoporosis

En Español (Spanish Version)

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Principal Proposed Natural Treatments
• Calcium and Vitamin D; Genistein and Other Isoflavones; Iprilavone; Strontium; Vitamin K

Other Proposed Natural Treatments
• Black Cohosh; Black Tea; Boron; Dehydroepiandrosterone (DHEA); Epimedium brevicornum; Estriol; Fish Oil; Gamma-linolenic Acid (GLA); Reducing High Homocysteine With Folate and Vitamin B₁₂; Magnesium; Manganese; Phosphorus; Progesterone; Royal Jelly; Silicon; Tai Chi; Trace Minerals

Herbs and Supplements to Use Only With Caution
• Vitamin A

Many factors are known or suspected to accelerate the rate of bone loss. These include smoking, alcohol, low calcium intake, lack of exercise, various medications, and several medical illnesses. Excessive consumption of vitamin A may also increase risk of osteoporosis, and rapid weight loss may increase the risk in postmenopausal women. Raw food vegetarians are also likely to have significant bone thinning.

In general, women are far more prone to osteoporosis than men. For this reason, the following discussion focuses almost entirely on women.

Hormone replacement therapy prevents or reverses osteoporosis in women. However, now that long-term use of hormone replacement therapy has been found to be unsafe, conventional medical treatment for osteoporosis in women centers mainly on drugs in the bisphosphonate family, such as Fosamax (taken along with calcium and vitamin D— see below).

Exercise, especially weight-bearing exercise, almost certainly helps strengthen bone (although the evidence for this apparently obvious statement is weaker than one might expect). Minimal evidence suggests that the Chinese form of exercise called Tai Chi may also provide some benefit.

Principal Proposed Natural Treatments

There is good evidence that people with osteoporosis, or who are at risk for it, should take calcium and vitamin D supplements regardless of what other treatments they may be using.

Substances called isoflavones found in soy and other plants may be helpful for osteoporosis (as well as general menopausal symptoms). Vitamin K and a new supplement called strontium ranelate have also shown promise. A semisynthetic isoflavone called iprilavone has shown considerable promise for osteoporosis, but safety concerns have decreased its popularity.

Calcium and Vitamin D

Calcium is necessary to build and maintain bone. You need vitamin D, too, as the body cannot absorb calcium without it. Many people do not get enough calcium in their daily diet. Although your body can manufacture
vitamin D when exposed to the sun, supplemental vitamin D may be necessary in this age of sunblock.

According to most, but not all studies, calcium supplements (especially as calcium citrate, and taken with vitamin D) appear to be modestly helpful in slowing down bone loss in postmenopausal women. Contrary to some reports, milk does appear to be a useful source of calcium for this purpose. Any improvements in bone density rapidly disappear once the supplements are stopped. People who religiously continue calcium use may do better than those who forget from time to time. Vitamin D without calcium, however, does not appear to offer more than minimal bone-protective benefits for seniors.

The effect of calcium and vitamin D supplementation in any form is relatively minor and may not be strong enough to reduce the rate of osteoporotic fractures. A large randomized trial of over 3,000 postmenopausal women aged 65-71 years found that three years of daily supplementation with calcium and vitamin D was not associated with a significant reduction in the incidence of fractures.

In a much larger observational study (not a randomized trial) involving 61,433 women aged 39-73, researchers investigated the effects of dietary calcium (as opposed to supplements) on the risk of osteoporosis and fracture over a 19-year period. They found that women who consumed less than 750 mg/day of calcium had a higher rate of osteoporotic fractures in any location. Unexpectedly, however, the study also found that those who consumed the highest amounts of calcium (over 1,137 mg/day) did not have a comparatively reduced rate of fractures or osteoporosis. Indeed, this high dietary intake was associated with an increase in the number of hip fractures for reasons the authors could not completely explain.

Use of calcium supplements early in life might put calcium "in the bank" and prevent problems later, especially when children also engage in physical exercise; however, study results are somewhat contradictory. One study found benefits for male seniors using a calcium and vitamin D-fortified milk product. However, there are some concerns that excessive calcium intake could raise the risk of prostate cancer in men. See the Calcium article for more information.

Vitamin D and calcium taken together may also have a modestly protective effect against the severe bone loss caused by corticosteroid drugs such as prednisone. Certain other supplements may enhance the effects of calcium and vitamin D. One study found that adding various trace minerals (zinc at 15 mg, copper at 2.5 mg, and manganese at 5 mg) produced further improvement. However, copper by itself may not be helpful.

There is some evidence that essential fatty acids may also enhance the effectiveness of calcium. In one study, 65 postmenopausal women were given calcium along with either placebo or a combination of omega-6 fatty acids (from evening primrose oil) and omega-3 fatty acids (from fish oil) for a period of 18 months. At the end of the study period, the group receiving essential fatty acids had higher bone density and fewer fractures than the placebo group. In contrast to this, however, a similar 12-month, double-blind trial of 42 postmenopausal women found no benefit from essential fatty acids. The explanation for the discrepancy may lie in the differences between the women studied. The first study involved women living in nursing homes, while the second studied healthier women living on their own. The second group of women may have been better nourished and already receiving sufficient essential fatty acids in their diet.

Finally, vitamin K may also enhance the effect of calcium (see below).

Interestingly, vitamin D may offer another benefit for osteoporosis in seniors: most, though not all, studies have found that vitamin D supplementation improves balance in seniors (especially female seniors) and reduces risk of falling. Since the most common adverse consequence of osteoporosis is a fracture due to a fall, this could offer a meaningful benefit.

There is weak, preliminary evidence that calcium supplementation in healthy, postmenopausal women may slightly increase the risk of cardiovascular events, such as myocardial infarction.

For more information, including dosage and safety issues, see the full articles on Calcium and Vitamin D.
Genistein and Other Isoflavones

Soy contains substances called isoflavones that produce effects in the body somewhat similar to the effects of estrogen. (For this reason, they are called “phytoestrogens.”) Although study results are not entirely consistent, growing evidence suggests that genistein and other isoflavones can (like estrogen) help prevent bone loss. 37-48,105,106,114,124-126,150-151,185

For example, in a 1-year, double-blind, placebo-controlled study, 90 women aged 47 to 57 were given genistein at a dose of 54 mg/day, standard hormone replacement therapy (HRT), or placebo. 106 The results showed that genistein prevented bone loss in the back and hip to approximately the same extent as HRT. No adverse effects on the uterus or breast were seen. A subsequent 2-year, double-blind study of 389 postmenopausal women with mild bone loss found that 54 mg of genistein plus calcium and vitamin D improved bone density to a greater extent than calcium and vitamin D alone. 185 However, a fairly high percentage of participants given genistein experienced substantial digestive distress.

In a 1-year, double-blind, placebo-controlled study of 203 postmenopausal Chinese women, use of soy isoflavones at a dose of 80 mg daily had mildly positive protective effects on bone mass in the hip. 125 This supplement contained 46.4% daidzein, 38.8% glycetein, and 14.7% genistein.

Another study evaluated an isoflavone supplement made from red clover (containing 6 mg biochanin A, 16 mg formononetin, 1 mg genistein, and 0.5 mg daidzein daily). 126 In this 1-year, double-blind, placebo-controlled study of 205 people, use of red clover isoflavones significantly reduced loss of bone in the lumbar spine. Benefits were also seen in a 1-year, double-blind, placebo-controlled study using an extract made from the soy product tofu. 127

However, it is not clear that the consumption of foods rich in isoflavones offers the same benefits. For example, in placebo-controlled study involving 237 healthy women in the early stages of menopause, the consumption of isoflavone-enriched foods (providing an average of 110 mg isoflavone daily) for one year had no affect on bone density or metabolism. 192

Interestingly, the effect of isoflavones on bone may be more complex than that of estrogen. Bone is always undergoing two opposite processes at once: bone breakdown and bone formation. Estrogen acts on the first of these processes: it inhibits bone breakdown. Isoflavones may affect both sides of the equation at once: inhibiting bone breakdown while at the same time enhancing new bone formation. 49,50,106,126,178

In about one out of three people, intestinal bacteria convert some soy isoflavones into a substance called "equol." Isoflavones may have a greater bone-protecting effect in such "equol producers." 152,183

For more information, including dosage and safety issues, see the full Soy article.

Strontium

Growing evidence indicates that the mineral strontium (as strontium ranelate) is effective as an aid in the treatment of osteoporosis. 115-117,137,138

The best and largest study on strontium was a double-blind, placebo-controlled study of 1,649 postmenopausal women with osteoporosis. 128 In this 3-year study, a dose of strontium ranelate at 2 g daily significantly increased bone density in the spine and hip, and significantly decreased the rate of vertebral fractures.

While some treatments for osteoporosis act to increase bone formation, and others decrease bone breakdown, some evidence suggests that strontium ranelate has a dual effect, providing both these benefits at once. 153

There is one major caveat, however. At present, all major controlled clinical trials of strontium ranelate have involved some of the same researchers. Entirely independent confirmation is needed. It is not clear to what extent the “ranelate” portion of strontium ranelate is necessary for this benefit, or whether other strontium salts would work as well.
Note: The strontium used in these studies is not the same as the radioactive strontium that was such a concern during the decades of above-ground atomic testing.

For more information, including dosage and safety issues, see the full Strontium article.

**Vitamin K**

Increasing, but inconsistent, evidence indicates that vitamin K may help prevent osteoporosis.\(^{51-60,111,154,173-174}\) It may work by reducing bone breakdown, rather than by enhancing bone formation.\(^{155}\)

Perhaps the best evidence for a beneficial effect comes from a 3-year, double-blind, placebo-controlled trial of 181 women.\(^{111}\) Participants, postmenopausal women between the ages of 50 and 60, were divided into three groups: placebo, calcium plus vitamin D plus magnesium, or calcium plus vitamin D plus magnesium plus vitamin K (at a dose of 1 g daily). Researchers monitored bone loss by using a standard DEXA bone density scan. The results showed that the study participants using vitamin K along with the other nutrients lost less bone than those in the other two groups.

However, another placebo-controlled trial involving 452 older men and woman with normal levels of calcium and vitamin D failed to demonstrate any beneficial effects of 500 mcg per day of vitamin K supplementation on bone health over a 3-year period.\(^{191}\)

For more information, see the full Vitamin K article.

**Ipriflavone**

Ipriflavone is a semisynthetic variation of soy isoflavones. Ipriflavone appears to help prevent osteoporosis by interfering with bone breakdown. Estrogen works in much the same way, but ipriflavone does not appear to produce estrogenic effects anywhere else in the body other than in bone. For this reason, it probably doesn’t increase the risk of breast or uterine cancer. However, it also doesn’t reduce the hot flashes, night sweats, mood changes, or vaginal dryness of menopause. In addition, it may cause health risks of its own.

Numerous double-blind, placebo-controlled studies involving a total of more than 1,700 participants have examined the effects of ipriflavone on various forms of osteoporosis.\(^{15-26}\) Overall, it appears that ipriflavone can stop the progression of osteoporosis and perhaps reverse it to some extent.

For example, a 2-year, double-blind study followed 198 postmenopausal women who had evidence of bone loss.\(^{27}\) At the end of the study, there was a gain in bone density of 1% in the ipriflavone group compared to a loss of 0.7% in the placebo group.

Conversely, the largest and longest study of ipriflavone found no benefit.\(^{28}\) In this 3-year trial of 474 postmenopausal women, no differences in extent of osteoporosis were seen between ipriflavone and placebo groups. However, for reasons that aren’t clear, the researchers in this study gave women only 500 mg of calcium daily. All other major studies of ipriflavone gave participants 1,000 mg of calcium daily. It’s possible that ipriflavone requires the higher dose of calcium to work properly.

Ipriflavone may also be helpful for preventing osteoporosis in women who are taking Lupron or corticosteroids, medications that accelerate bone loss.\(^{29-31}\) (However, the combined use of ipriflavone and drugs that suppress the immune system, such as corticosteroids, presents risks.)

There is some evidence that combining ipriflavone with estrogen may improve anti-osteoporosis benefits.\(^{32-33}\) However, we do not know whether such combinations increase or decrease the other benefits and adverse effects of estrogen-replacement therapy.

Finally, for reasons that are not at all clear, ipriflavone appears to be able to reduce pain in osteoporosis-related fractures that have already occurred.\(^{34-36}\)
Other Proposed Natural Treatments

It is often said that magnesium supplements are helpful for strong bones, but there is only minimal evidence to support this claim. It has been suggested (though with little meaningful supporting evidence), that the typical American diet causes the body to become acidic, and that this in turn leads to bone loss. One study tested potassium citrate as a treatment for bone loss, in the belief that this supplement would counteract this hypothesized diet-related acidity. The results in this 1-year study of 161 postmenopausal women indicated that potassium citrate reduced bone loss to a greater extent than the placebo used (potassium chloride). This study suffered from numerous problems in design, analysis, and reporting, and does not necessarily show anything about dietary “acidity.” It may, however, indicate that the citrate part of potassium citrate has some bone-protective effects. If this is in fact true, it could in turn explain why calcium citrate has, in some studies, proven more effective for treating or preventing osteoporosis than other forms of calcium.

Observational studies hint that higher levels of high homocysteine might increase risk of osteoporosis. Vitamins $B_{12}$, $B_{6}$, and folate are known to reduce homocysteine levels. On this basis, supplementation with these vitamins has been proposed for preventing or mitigating the effects of osteoporosis. One double-blind study found weak evidence that supplemental folate and vitamin $B_{12}$ (known to reduce homocysteine) might reduce risk of osteoporotic fractures in people who had suffered a stroke. However, two other studies failed to find that use of mixed B-vitamins had any positive effect on bone density or chemical markers of bone turnover.

Some evidence suggests that the hormone DHEA may be helpful for preventing or treating osteoporosis, especially in postmenopausal women over 70. One study found weak evidence that DHEA might be helpful for preventing the osteoporosis that sometimes develops in women with anorexia nervosa. Chinese studies suggest that the herb *Epimedium brevicornum* has phytoestrogenic effects and, on this basis, may be helpful for preventing bone loss. (*Epimedium brevicornum* is related, but not identical, to *Epimedium sagittatum*, otherwise known as horny goat weed.)

Very preliminary evidence suggests that black tea may help protect against osteoporosis. Similarly weak evidence hints that the herb black cohosh might help prevent osteoporosis.

Although it has long been stated that high phosphorus intake due to consumption of soft drinks might lead to osteoporosis, there is no solid evidence for this claim; in fact, elevated intake of phosphorus may help prevent osteoporosis. The reason is that bone contains both calcium and phosphate. According to one very preliminary study, but not another, boron may be helpful for preventing osteoporosis. However, there are some concerns that boron supplements may raise levels of the body's own estrogen, especially in women on estrogen-replacement therapy, and therefore might present an increased risk of cancer. If you want to increase your boron intake, the best way might be to eat more fruits and vegetables.

One study widely advertised as showing that silicon is helpful for osteoporosis actually failed to show much of anything. Extremely weak evidence hints at possible benefit for osteoporosis through use of royal jelly.

Although it has long been believed that consuming too much protein (especially animal-based protein) increases the risk of osteoporosis, the balance of available evidence suggests the reverse: if anything, high intake of protein appears to help strengthen bone. One study found that calcium supplements may do a better job of strengthening bones in people with relatively high protein intake than those with lower intake.
It has been suggested both that water fluoridation helps prevent osteoporosis and that it also causes the condition; on balance, however, the evidence suggests that it does neither. 187

One study failed to find arginine supplements helpful for enhancing bone density.139

The Progesterone Story

Many books promote the idea that natural progesterone prevents or even reduces osteoporosis. In this case, the term natural indicates that we are using the same progesterone found in the body. It is still made synthetically, but it is called "natural progesterone" to distinguish it from its chemical cousins known as progestins. Generally, prescription "progesterone" is actually a progestin.

The progesterone/osteoporosis story began with test tube and other preliminary studies suggesting that progesterone or progestins can stimulate the activity of cells that build bone. 71,72 Subsequently, a poorly designed and uncontrolled study (really a series of case histories from one physician's practice) purportedly demonstrated that progesterone cream can slow or even reverse osteoporosis. 73-75

However, a 1-year, double-blind trial of 102 women given either progesterone cream (providing 20 mg progesterone daily) or placebo cream, along with calcium and multivitamins, found no evidence of any improvements in bone density attributable to progesterone. 76

Furthermore, in a 3-year study of 875 women, combination treatment with estrogen and oral progesterone was no more effective for osteoporosis than estrogen alone. 77

The Estriol Story

For over a decade, some alternative medicine practitioners have popularized the use of a special form of estrogen called estriol, claiming that, unlike standard estrogen, it doesn't increase the risk of cancer. However, this claim is unfounded.

Controlled trials performed in Japan have found that estriol helps prevent bone loss in menopausal women, 78-82 although one small study found no benefit. 83

However, like other forms of estrogen, oral estriol stimulates the growth of uterine tissue. This leads to a risk of uterine cancer.

In a placebo-controlled study of 1,110 women, uterine tissue stimulation was seen among women given estriol orally (1 mg to 2 mg daily) as compared to those given placebo. 84 Another large study found that oral estriol increased the risk of uterine cancer. 85 In another study of 48 women given estriol at a dose of 1 mg twice daily, uterine tissue stimulation was seen in the majority of cases. 86

In contrast, a 12-month, double-blind trial of oral estriol (2 mg daily) in 68 Japanese women found no effect on the uterus. 87 It may be that the high levels of soy in the Japanese diet altered the results. Additionally, test tube studies suggest that estriol is just as likely to cause breast cancer as any other form of estrogen. 98

The bottom line: If you use estriol, you should consider it like any other form of estrogen.

Herbs and Supplements to Use Only With Caution

While the evidence is not yet strong, some research suggests that excessive intake of vitamin A may increase the risk of osteoporosis. 1109
Various herbs and supplements may interact adversely with drugs used to treat osteoporosis. For more information on this potential risk, see the individual drug article in the Drug Interactions section of this database.

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