

Protecting Your Bones

PHYSICIANS COMMITTEE FOR RESPONSIBLE MEDICINE

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Osteoporosis is a bone-thinning condition commonly seen in elderly men and in postmenopausal women. It can lead to dangerous and potentially disabling fractures, particularly in the vertebrae and the hip. Approximately one in two women and up to one in four men age 50 and older will break a bone due to osteoporosis.¹

Calcium is an essential mineral for maintenance of bone integrity, but studies show that adding more calcium to your diet doesn't automatically protect your bones. In an 18-year prospective analysis of 72,000 postmenopausal women, researchers found that higher total calcium intake was not associated with decreased fracture risk.² In order to protect your bones you not only need calcium in your diet, but you also need to make sure you keep calcium in your bones.

How to Get Calcium Into Your Bones

1. Get calcium from greens, beans, or fortified foods. Recommended calcium intake is 1,000 mg/day for men and women 19-50 years old, and 1,200 mg/day for those older than 51.³ As a general rule, the most healthful calcium sources are green leafy vegetables and legumes. While dairy products do contain calcium, they also contain animal proteins and growth factors, lactose sugar, occasional contaminants, and a substantial amount of fat and cholesterol (in all but the defatted versions), making them an unfavorable choice for obtaining calcium. Broccoli, Brussels sprouts, collards, kale, mustard greens, green cabbage, and other greens are loaded with highly absorbable calcium and a host of other healthful nutrients. Exceptions include spinach and chard, which contain calcium but hold onto it very tenaciously, making it difficult for you to absorb much of it. You will find plenty of calcium in chickpeas, tofu, or other bean or bean products as well. These beans and greens also contain magnesium, which your body requires along with calcium to build bones, making them optimal dietary choices for improving bone health.

Calcium-fortified products contain very concentrated amounts of calcium. For example, calcium-fortified orange or apple juices contain 300 milligrams or more of calcium per cup in a form as absorbable as cow's milk.

2. Get adequate amounts of vitamin D. Vitamin D controls your body's use of calcium. Without vitamin D, only 10-15 percent of dietary calcium is absorbed.⁴ Thus, in order to maintain bone health and to experience benefits from calcium, vitamin D intake must be sufficient. In fact, while calcium in dairy products alone may not directly strengthen bones, increasing intake of vitamin D

has been shown to reduce fracture risk up to 26 percent.⁵

About 15 minutes of sunlight on your skin each day normally produces all the vitamin D you need. If you get little or no sun exposure, you can get vitamin D from a supplement or from fortified foods. The Recommended Dietary Allowance for adults is 600 IU (15 micrograms) per day.³

How to Keep Calcium in Your Bones

Even more critical than getting calcium into your bones is keeping it there. Here are some ways you can accomplish this:

1. Avoid excess salt. High salt intake is a commonly recognized risk factor for osteoporosis because it leads to calciuria, or excessive urinary calcium excretion. Most of the calcium in the body is stored in the bone, and the rest is found in the blood. The blood level of calcium is carefully controlled. When it is too low, calcium from the bones dissolves into the bloodstream. When it is too high, the extra calcium either passes through the kidneys and out of the body through the urine or gets stored in the bones. Normal levels of calcium found in the urine are 100-250 mg/day. If you excrete more than this amount, calcium loss becomes a problem. Sodium in the foods you eat can greatly increase calcium loss through the kidneys.⁶

In a study investigating the impact of salt intake as related to calcium absorption in postmenopausal women, salt was found to be responsible for a negative change in bone calcium balance, which measures how much calcium absorbed from the diet actually stays in the bones. It was also directly associated with increased urinary calcium excretion.⁷

If you reduce your sodium intake to 1 to 2 grams per day, you will hold onto calcium better. To do this, avoid salty snack foods and canned goods with added sodium, and keep salt use low on the stove and at the table.

2. Get your protein from plants, not animal products. Animal protein—in fish, poultry, red meat, eggs, and dairy products—tends to encourage calcium's passage into the urine. This occurs because the high amounts of sulfur-containing amino acids in animal proteins cause an acidification of the blood, and calcium is released from the bones in order to neutralize it. Whether this leads to poorer bone health remains up for debate. However, plant protein—in beans, grains, and vegetables—does not appear to have this effect. In fact, a 1994 report in the American Journal of Clinical Nutrition showed that when animal proteins were eliminated from the diet, calcium losses were cut in half.⁸

3. Exercise. Exercise is vital for keeping calcium in the bones and increasing bone density. Benefits have been observed in studies of both children and adults.⁹⁻¹¹ In a year-long study of 320 postmenopausal women, those who completed aerobic, weight-bearing activity combined with weight lifting three times a week had a significant increase in regional bone density, compared with those who did not exercise.¹² Moreover, physical activities help to stimulate increases in bone diameter which can counteract the thinning of bones, and in turn, lessen the risk of fractures.¹³

4. Don't smoke. Smoking is a risk factor for increased bone mineral density loss. Smoking may affect bone loss through toxic effects on bone collagen synthesis, changes in hormonal metabolism,¹⁴ and by decreasing efficiency of calcium absorption.¹⁵ A study of identical twins showed that if one twin had been a long-term smoker and the other had not, the smoker had more than a 40 percent higher risk of a fracture.¹⁶

American recommendations for calcium intake are high, partly because high meat and salt intake, tobacco use, and physical inactivity of American life all lead to overly rapid and unnatural loss of calcium through the kidneys. By controlling these basic factors, you can have an enormous influence on whether calcium stays in your bones or drains out of your body.

Calcium Supplements

Calcium supplements are commonly recommended to men and women as they age to promote bone health; however, recent research suggests that these supplements may be dangerous. In a meta-analysis evaluating the occurrence of cardiovascular events in 11 placebo-controlled trials of calcium supplements, researchers found those taking supplements had about a 30 percent increased risk for heart attack. In addition, boosting overall calcium had no cardiovascular benefit.¹⁷ Another study, which analyzed cardiovascular health of 23,980 participants of the Heidelberg cohort in the European Prospective Investigation into Cancer and Nutrition (EPIC) study, aged 35-64, users of calcium-only supplements had a 70 percent increased heart attack risk.¹⁸

Though the percentages vary, research is making it increasingly clear that calcium supplements may be harmful to one's health. A recommendation by the U.S. Preventive Services Task Force (USPSTF), based on the review of more than 100 studies, said that postmenopausal women should not take supplements to prevent fractures.¹⁹ Therefore, in an effort to promote bone health, calcium intake should come from food sources instead.

Hormone Supplements Have Serious Risks

Some doctors recommend estrogen supplements for women after menopause as a way to slow osteoporosis, although they are rarely able to stop or reverse bone loss. These hormones may pose other health hazards such as increased breast cancer risk and cardiovascular problems. The Harvard Nurses' Health Study found that women

taking estrogen supplements had a 30 to 80 percent increased risk for breast cancer, compared to those not taking estrogens.²⁰ In a study of 2,763 postmenopausal women with coronary disease followed for an average of four years, hormone-treated women were more likely to develop dangerous blood clots and gallbladder disease.²¹

A nonprescription hormone preparation derived from wild yams or soybeans, called natural progesterone, may be a safer and more effective alternative for stimulating the building of healthy new bone. In a three-year study involving postmenopausal women, bone density increased by about 15 percent for those treated with natural progesterone.²² This increase in bone density is enough to significantly decrease fracture risk.

Reversing Osteoporosis

It is recommended for postmenopausal women with other risk factors and for women over 65 to have their bone density tested. If diagnosed with osteoporosis, you will want to speak with your doctor about exercises and perhaps even medications that can reverse it. Bisphosphonates are often prescribed because they can prevent bone reabsorption.²³ Nonpharmacologic interventions, such as dietary changes and exercises, can reduce the risk of fracture in those with osteoporosis as well.

Osteoporosis in Men

Osteoporosis is less common in men than in women largely because men typically accumulate more bone mass than women before bone loss naturally begins. In cases where the causes of bone thinning are excessive calcium loss and inadequate vitamin D, following the guidelines mentioned earlier will decrease risk of fractures. In about half the cases of male osteoporosis, however, a specific cause of this bone thinning can be identified and addressed.²⁴

- **Steroid medications**, such as prednisone, are a common cause of bone loss and fractures. If you are receiving steroids, you will want to work with your doctor to minimize the dose and to explore other treatments.

- **Alcohol** can weaken your bones by interfering with the absorption of calcium and vitamin D and by killing osteoblasts, the bone-making cells. Thus, heavy alcohol consumption can increase risk of fracture. The effect is most likely only significant for heavy consumers—those who have more than two drinks per day of spirits, beer, or wine.²⁵

- **A lower than normal amount of testosterone** can encourage osteoporosis. One study found a 6 percent increased prevalence for osteoporosis in men with deficient testosterone levels.²⁶ This is a significant concern because about 40 percent of men over 70 years of age have decreased levels of testosterone.

Conclusion

Bone health is incredibly important and cannot be overlooked. Getting calcium from plant-based products is optimal, as these sources will allow you to meet the daily recommended amounts while also providing you with other essential nutrients. The methods outlined here to keep the calcium in your bones are much safer than taking calcium supplements, and will help to prevent osteoporosis.

Remember: Osteoporosis is much easier to prevent than to treat. Prevention of osteoporosis should begin in childhood and continue throughout one's life.

Calcium and Magnesium in Foods (in mg)

	CALCIUM	MAGNESIUM
Collards (1 cup, boiled)	268	40
Orange juice, calcium-fortified (1 cup)	349	27
Figs, dried (10 medium)	136	57
Tofu, calcium-set (1/2 cup)	861	73
Spinach (1 cup, boiled)	245	157
Soybeans (1 cup, boiled)	261	108
Oatmeal, fortified instant (1 packet)	98	36
White beans (1 cup, boiled)	161	113
Mustard greens (1 cup, boiled)	165	18
Navy beans (1 cup, boiled)	128	96
Great northern beans (1 cup, boiled)	120	88
Black turtle beans (1 cup, boiled)	102	91
Broccoli (1 cup, boiled)	62	33
Kale (1 cup, boiled)	94	23
English muffin	101	21
Butternut squash (1 cup, boiled)	46	22
Pinto beans (1 cup, boiled)	79	86
Chick peas (1 cup, canned)	109	61
Almonds (1 ounce, 23 nuts)	76	77
Sweet potato (1 cup, boiled)	76	54
Green beans (1 cup, boiled)	55	22
Barley (1 cup)	61	245
8 Brussels sprouts	60	34
Navel orange (1 medium)	60	15
Raisins (2/3 cup)	54	35

Source: U.S. Department of Agriculture, Agricultural Research Service. 2011. USDA National Nutrient Database for Standard Reference, Release 26. Nutrient Data Laboratory Home Page, <http://ndb.nal.usda.gov/>.

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