





Building Bone Density & Preventing Osteoporosis

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Osteoporosis is a loss of normal bone density caused by loss of minerals and other substances from in the bones.

This results in thinning, brittle bones, and occurs most frequently in women who have gone through menopause, patients who are inactive or paralyzed, and in patients taking steroid hormones. Osteoporosis may cause pain, especially in the lower back, frequent fractures (broken bones), loss of body height, and various badly formed parts of the body.

Treatment for osteoporosis

Particularly where postmenopausal women are concerned, estrogen replacement has been the mainstay of therapy for the prevention and treatment of osteoporosis. However, long-term compliance with estrogen therapy is often poor, and there are numerous concerns regarding its safety. Other medical treatments for osteoporosis include strength-training exercise as well as calcium and vitamin D supplementation. In addition, there are other nutraceuticals which may also help. These will be discussed below.

Calcium

Calcium is a prevalent mineral in the human body with 99% of it found in bones and teeth, and the remaining 1% found in blood and soft tissue. Together, with phosphate, these two minerals form hydroxyapatite crystals, a major component of bone. Inadequate calcium intake and/or resorption of bone calcium into the blood (to be used for other purposes) may result in osteoporosis over a long period of time. Conversely, calcium plays a well-established role in the prevention and treatment of osteoporosis. Furthermore, calcium supplementation has been shown to effectively slow bone loss. Research overwhelmingly supports the use of calcium supplementation, alone or in combination with other therapies, for slowing or stopping the progression of osteoporosis. Furthermore, the data on calcium and osteoporosis is so compelling that the FDA has approved either of these healthy claims: “Adequate calcium throughout life, as part of a well-balanced diet, may reduce the risk of osteoporosis,” or “Adequate calcium as part of a healthful diet, along with physical activity, may reduce the risk of

osteoporosis in later life.”

In addition, osteoporosis can lead to an increased incidence of fractures. Research has clearly shown that calcium supplementation can help to reduce the risk of, and even prevent fractures in osteoporosis. As a matter of fact, one meta-analysis estimated that 134,764 hip fractures and \$2.6 billion in direct medical costs could have been avoided in one year if individuals aged 50 years or up consumed approximately 1200 mg daily of supplemental calcium.

There is still debate about which form of calcium (i.e. calcium salt) is the best. The debate may stem from the fact that some research has found that approximately the same level of absorption occurs with various forms of calcium (including calcium citrate, calcium carbonate, hydroxyapatite, calcium gluconolactate, and calcium pidolate), while other research has shown that certain forms of calcium (such as calcium citrate) are better absorbed over other forms (such as calcium gluconolactate and carbonate). Still other research shows that calcium carbonate is fairly well absorbed when taken with a meal. The fact is that all of the research shows that these forms of calcium are absorbed, and have value for bone health. Between 1,000-1,500 mg daily are commonly used doses.







Vitamin D

Vitamin D is the “sunshine vitamin”, so coined because exposure to the sun’s ultraviolet light will convert a form of cholesterol under the skin into vitamin D. In addition to multiple roles in human health, this nutrient is best known for its role in helping to facilitate the absorption of calcium and phosphorus (as well as magnesium), and so helping to promote bone health.

It should be noted that outright vitamin D deficiency is present in 41.6 percent of the U.S. population,ⁱ while vitamin D insufficiency (i.e., lacking sufficient vitamin D) is present in 77 percent of the population.ⁱⁱ If you are deficient in vitamin D you will not be able to absorb enough calcium to satisfy your body’s calcium needs. It has long been known that severe vitamin D deficiency has serious consequences for bone health, but other research indicates that lesser degrees of vitamin D deficiency are common and increase the risk of osteoporosis and other health problems.

A prospective cohort study that followed more than 72,000 postmenopausal women in the U.S. for 18 years found that those who consumed at least 600 IU/day of vitamin D from diet and supplements had a 37% lower risk of osteoporotic hip fracture than women who consumed less than 140 IU/day of vitamin D. The results of most clinical trials suggest that vitamin D supplementation can slow bone density losses or decrease the risk of osteoporotic fracture in men and women who are unlikely to be getting enough vitamin D. However, recent analyses indicate that there is a threshold of vitamin D intake that is necessary to observe reductions in fracture risk. For instance, a recent meta-analysis of randomized controlled trials in older adults found that supplementation with 700 to 800 IU vitamin D daily had a 26% and 23% lower risk of hip fracture and nonvertebral fracture, respectively. In contrast, supplementation with 400 IU of vitamin D daily did not decrease risk of either hip or nonvertebral fracture. Bischoff-Ferrari et al. suggest that daily intakes of greater than 700 IU of vitamin D may be necessary to optimize serum concentrations and thus reduce fracture risk. Furthermore, research indicates that supplementation with at least 800-1,000 IU daily are required to achieve the recommended serum levels of vitamin D.

There are two forms of vitamin D available as a dietary supplement: cholecalciferol (vitamin D3) and ergocalciferol (vitamin D2). Cholecalciferol is the form made in the human body, and it is more active than ergocalciferol. In fact, Vitamin D2 potency is less than one third that of vitamin D3. Commercially, ergocalciferol is derived from yeast, and so is considered vegetarian, while cholecalciferol is derived from lanolin (from sheep) or fish oil.

Magnesium

Magnesium also plays a well-established role in bone health. More than 60% of total body magnesium is found in the skeleton, and about 27% is found in muscle. According to the United States Department of Agriculture, Agricultural Research Service, 57% of the US population does not meet the recommended dietary allowance (RDA) for levels of magnesium (400 mg for adults 19-30 years, 420 mg for adults ≥ 31 years). In addition gastrointestinal disorders, renal disorders, chronic alcoholism and multiple medications may increase the risk of magnesium deficiency. Likewise, intestinal magnesium absorption tends to decrease with age and urinary magnesium excretion tends to increase with age.

Given its role in bone health, it is not surprising that people with osteoporosis were reported to be at high risk for magnesium malabsorption.ⁱ Furthermore, boneⁱⁱ and blood levels of magnesium have also been reported to be low in people with osteoporosis. Research has shown that supplementing with magnesium was able to reduce indications of bone loss.^{iv} The effect of magnesium treatment on trabecular bone density in postmenopausal osteoporosis was investigated using 250-750 mg of magnesium daily for 6 months, and 250 mg for another 18 months. The results were that no new fractures occurred, and 71% of patients responded by a 1-8% rise of bone density, while the mean bone density decreased significantly in untreated controls.

Ipriflavone, soy isoflavones & boron

In addition to calcium, vitamin D and magnesium, there are a few other compelling nutraceuticals with good science. One example is Ipriflavone (Ostivone), an isoflavone manufactured in the laboratory from soy daidzein. Ipriflavone supports the function of osteoblasts (i.e. bone-building cells) function and inhibits bone resorption, mainly by inhibiting recruitment of osteoclasts (i.e. cells that breakdown bone); typically 600 mg/day is used. Likewise, soy isoflavones provide weak estrogenic effects on bone, resulting in significant support for bone density—with 80-120 mg typically used. In addition, chronically low intakes of the trace mineral boron may be a predisposing factor in osteoporosis, and clinical research in which postmenopausal women were supplemented with 3 mg boron daily showed that it helped prevent calcium loss and bone demineralization.



Conclusion

The individual use of the aforementioned nutrients and dietary substances may help to prevent or slow the progression of osteoporosis. The results are likely to be much greater if a combination of many or all of these substances are used concurrently. In addition, a lifestyle that includes some resistance-type exercise (e.g., weight-lifting), may also help to build bone density.

