

Osteoporosis and Bone Health

Osteoporotic fractures can be associated with chronic pain and loss of independence. Both men and women are at risk for osteoporotic fractures. Women are at risk for fractures earlier than men, due to the rapid loss of bone density in the early years after menopause. There are about 250,000 hip fractures and about 500,000 vertebral fractures per year among U.S. women.

Bone Density Tests

Bone Density Tests are special x-rays or ultrasounds that photograph your bones in a way that allows a calculation of the density of your bones. Research shows that bones with high bone density are less likely to fracture than bones with low bone density.

Research also shows that every bone in your body does not have to be tested to estimate your risk of fracture. By looking only at certain bones, such as the wrist, spine, hip, and/or heel, one can make a good estimate of the bone density of your entire skeleton.

Interpreting Bone Density Tests

The World Health Organization defines **normal bone density** as a "T score" value within one standard deviation of the bone mass of a young adult. Therefore, a T score of -1 to +1 means normal bone density.

Osteopenia (thin bones) exists when the density is between 1 and 2.5 standard deviations below the bone density of a young adult. This is a T score of -1 to -2.5.

Osteoporosis (fragile bones) exists when the density is more than 2.5 standard deviations below the bone mass of a young adult. This is a T score greater than (more negative than) -2.5.

For each one standard deviation below peak bone density (T score), lumbar spine fracture risk increases 2.2-fold and hip fracture risk increases 2.4-fold.

Loss of Bone Density

For most of us, our bone density starts to decline around age 35. Because the hormone estrogen helps maintain bone density in women, women are at special risk for loss of bone density after menopause. There are about 250,000 hip fractures and about 500,000 vertebral fractures per year among U.S. women. Below is a list of factors that are associated with accelerated loss of bone density:

Menopause	Long-term use of steroids (such as prednisone)
Cigarette smoking	Excessive thyroid hormone
Low body weight	Family history of osteoporosis
White race	Inadequate weight-bearing activity
Lifelong insufficient calcium and Vitamin D intake	

Improving Bone Density and Reducing Bone Loss

Physical Activity: Bedrest and minimal physical activity accelerate bone loss, while weight-bearing (high impact and resistance) physical activity helps maintain bone strength. Physical activity also helps maintain muscular strength and balance, which helps reduce the likelihood of fracture by reducing the likelihood of falling.

Calcium and Vitamin D: For children, adequate calcium and Vitamin D are very important in achieving peak bone density. For adults, they are very important to maintaining bone density throughout life. Experts recommend at least 1,000 mg of calcium a day in men and in pre-menopausal women, and 1,500 mg a day in post-menopausal women who do not take estrogen (1,000 mg a day if a post-menopausal woman does take estrogen).

Vitamin D is necessary for optimal calcium absorption. Experts recommend 400-800 IU of Vitamin D each day.

Major dietary sources of Calcium:

Dairy products:

Milk	294 mg per cup
Pudding	250 mg per cup
Ice cream	236 mg per cup
Cottage cheese	230 mg per cup
Cheddar cheese	213 mg per ounce
American cheese	198 mg per ounce
Mozzarella cheese	207 mg per ounce

Vegetables:

Collard greens	350 mg per cup (cooked)
Turnip greens	200 mg per cup (cooked)
Chinese cabbage	150 mg per cup (cooked)
Mustard greens	125 mg per cup (cooked)
Kale	100 mg per cup (cooked)
Broccoli	75 mg per cup (cooked)
Cauliflower	36 mg per cup (cooked)

Beans:

Baked beans	200 mg per cup (cooked)
Chili con carne	66 mg per cup

Nuts:

Almonds	75 mg per ounce
Brazil nuts	130 mg per ounce
Mixed nuts	48 mg per 1/2 cup

Fruits:

Prunes, dried, uncooked	18 mg per 1/4 cup
Raisins	21 mg per 1/4 cup

Other:

Sardines	275 mg per 3 ounces
Tofu	215 mg per 4 ounces
Salmon	180 mg per 3 ounces
Shrimp	98 mg per 3 ounces
Calcium-enriched fruit juices	150-300mg per cup

Calcium Supplements:

Calcium Carbonate is the most common and cheapest form available. The chewable forms of calcium carbonate are better absorbed than the tablet forms. "Tums" is a chewable form of calcium carbonate. Another chewable form is "Caltrate 600 Plus Chewables." Determine how much to take by adding up the "elemental calcium" in each tablet, rather than "total calcium." **Calcium Citrate** is better absorbed than calcium carbonate but can be more expensive. It is a better source of calcium if you have limited gastric acid production. A brand name is "Citrical." There is no clear evidence that one brand is better than another brand, as long as you take enough calcium to total your target of elemental calcium. When taking more than 500 mg a day, divide your calcium over the day to achieve greater absorption.

Bisphosphonate medications

At present, the only two bisphosphonate medications are Fosamax (Alendronate) and Actonel (Risendronate). They reduce the risk of vertebral fractures and reduce the risk of non-vertebral fractures (such as hip and wrist) in women with osteoporosis.

Hormone replacement therapy

Estrogen: For menopausal women, hormone replacement therapy (estrogen supplementation) has been shown to preserve bone density.

Selective Estrogen Receptor Modulators: Similar to estrogen on the effects on the bone, but without estrogen effects on the breast or uterus.

Plant-derived estrogen: There is a great deal of public interest in these products, also called "natural" estrogens. Although some animal studies are promising, there are no studies showing that they reduce fracture risk in humans.

Calcitonin

Available as a nasal spray and an injection. There is evidence that 200 IU a day will reduce the risk of vertebral fractures. Evidence is not as clear whether it reduces the risk of hip fracture.

For More Information

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National Institutes of Health, Osteoporosis and Related Bone Diseases National Resource Center. Phone: 800/624-

BONE. Web site: www.osteoporosis.gov/

National Institute on Aging, *Preventing Falls and Fractures*. Order by phone: 800/222-2225. Web site:

www.nih.gov/nia