

Nutrition and Health Info Sheet: Osteoporosis

For Health Professionals

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What is osteoporosis?

Osteoporosis is a decrease in bone density and strength, resulting in increased susceptibility to bone fractures.¹ Osteoporosis is a debilitating disease most commonly found in postmenopausal women; however, men are also at risk for this disease. In the United States, 8 million women and 2 million men are estimated to have osteoporosis.² Osteoporosis cannot be cured; it can only be prevented or its progression delayed. Peak bone mass is achieved in early adulthood (between the ages of 18-25), and remains relatively stable until the onset of menopause. Menopause results in an increase of bone loss, which ranges from 3 to 7 percent in during the first 6 to 7 years postmenopause. After this point, bone loss still occurs but at a much lower rate (0.5 to 2 percent per year).³

What are the risk factors for osteoporosis?

According to the National Osteoporosis Foundation risk factors that are not modifiable include:¹

- Being over age 50
- Being female
- Menopause
- Family history of osteoporosis
- Low body weight/being small and thin
- Broken bones or height loss



While genetics plays an important role in the development of osteoporosis, there are other factors that affect bone density and can therefore influence the onset of the disease.

Modifiable risk factors include:

- Not consuming enough calcium and vitamin D
- Lack of exercise
- Smoking
- Excessive alcohol intake
- Excessive protein, sodium, and caffeine intake

What is the relationship between calcium and osteoporosis?

An adequate intake of calcium is essential to maximize and maintain bone density. A calcium-poor diet is a primary risk factor for osteoporosis. Calcium is lost from the bones due to menopause and aging. While most age groups have adequate calcium intake, many girls between the ages of 9 and 18 are falling below the estimated average requirement. This is a concern as these years are important in optimizing peak bone mass.³

What other nutrients are important?

Along with calcium, it is important to consume enough vitamin D (which stimulates intestinal absorption of calcium) throughout life. While one can attain enough vitamin D from synthesis in the skin when exposed to the sun, less vitamin D is made in the skin with aging, and those who are bound to the home or hospital will have little exposure to the sun.⁴ For this reason, it is recommended that people 50 and older consume 600-800 International Units of Vitamin D daily.⁴ Researchers have also noted a correlation between low protein intake and decreased bone mass, making protein another nutrient essential to bone health.⁵ Furthermore, diets high in fiber can interfere with calcium absorption; however, since most people do not get enough fiber in their diets, this should not be a reason to reduce fiber intake. Magnesium also plays a role in bone remodeling and older adults should be sure to consume recommended levels of magnesium from the diet as magnesium absorption decreases and renal excretion increases in this population.⁶

What is the effect of exercise?

Exercise is very important for bone health. A regular routine of weight-bearing exercise such as walking, jogging, or aerobics is very important to maintain bone strength. Those who need to remain immobile because of illness should consult their physician about strategies to maintain bone density. Immobility can result in the loss of a substantial amount of skeletal minerals, particularly during the first 6 months.⁷



What is the effect of smoking?

Smokers are more susceptible to bone loss. Smoking lowers the production of estrogen, causes estrogen to be metabolized more quickly, reduces calcium absorption, and is associated with early menopause.⁸



What is the effect of caffeine?

Consumption of caffeine is a known modifiable risk factor for osteoporosis. Research suggests that daily consumption of 2-5 cups of caffeinated beverages increases calcium excretion through urine.⁹

What is the effect of alcohol?

High intakes of alcohol increase the amount of calcium lost in the urine. The calcium lost in urine is associated with a reduction in bone mass and can increase susceptibility to the development of osteoporosis.⁹

How can one reduce the risk or delay the progression of osteoporosis?

Consume an optimal amount of calcium

The Dietary Reference Intakes for calcium (Table 1) were determined by considering the latest research in osteoporosis prevention. These recommendations are set at the levels believed to provide maximum benefit in terms of optimizing bone density across the lifespan. Although it is important to consume enough calcium to meet these recommendations, it can be damaging to consume too much calcium. Calcium intakes above tolerable upper intake levels (ULs), shown in Table 1, may be associated with serious side effects. The ULs are not an intake goal; rather, the recommended daily allowance (RDA) is best for maintaining bone health.



Table 1. Current recommendations for calcium intake for various age groups

Age Group and Pregnant or Lactating Women	USDA MyPlate Dairy Group Recommendations (per day)	Current Calcium Recommended Daily Allowance	Tolerable Upper Intake Level (per day)
Infants birth to 6 mo 7-12 mo	No recommendation No recommendation	200 mg 260 mg	1,000 mg 1,500 mg
Children 1-3 yr 4-8 yr	2 cups (children 2 and older) 2 ½ cups	700 mg 1000 mg	3,000 mg 3,000 mg
Adolescents 9-13 yr 14-18 yr	3 cups 3 cups	1,300 mg 1,300 mg	2,500 mg 2,500 mg
Adults 19-30 yr 31-50 yr 51-70 yr (Women) 50-70 yr (Men) >70	3 cups 3 cups 3 cups 3 cups 3 cups	1,000 mg 1,000 mg 1,200 mg 1,000 mg 1,200 mg	2,500 mg 2,500 mg 2,000 mg 2,000 mg 2,000 mg
Pregnant women ≤18 yr 19-50 yr	3 cups 3 cups	1,300 mg 1,000 mg	3,000 mg 2,500 mg
Lactating women ≤18 yr 19-50 yr	3 cups 3 cups	1,300 mg 1,000 mg	3,000 mg 2,500 mg

Sources: IOM (Institute of Medicine). 2011. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: The National Academies Press; MyPlate website; <http://www.choosemyplate.gov/dairy>. Accessed Sep. 19, 2015

What are good sources of calcium?



Dairy products (milk, cheese, yogurt, etc.) are the most concentrated food sources of calcium (e.g. one cup of milk contains approximately 271 mg of calcium). As shown in Table 2, tofu is the most concentrated source of nondairy calcium. Even individuals who are lactose intolerant are usually able to eat small amounts of dairy products such as yogurt, cheese, and lactase-treated milk, especially when eaten as part of a meal. Those who avoid dairy products due to allergies may select nondairy foods that contain calcium, such as beans, tofu (if processed with calcium sulfate), broccoli, kale, and canned fish with bones. However, it is difficult to absorb the same amount of calcium from these nondairy alternatives as from dairy products because the overall calcium concentrations and bioavailabilities are lower. Calcium-rich foods and calcium-fortified foods are the preferred choices for obtaining calcium because additional nutrients (e.g. vitamin D in milk) can contribute to bone development and the prevention of osteoporosis. Check food labels to find out the percentage of calcium in processed foods. Every 10 percent of calcium listed on the label is equivalent to approximately 100 mg of calcium. For those who are unable to attain sufficient calcium through their diet, supplements such as calcium citrate or calcium carbonate are recommended.³



What are some food sources rich in calcium?

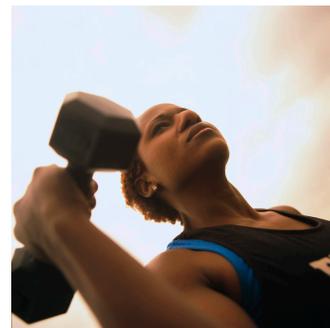
Table 2. Calcium-rich food sources⁸

	Serving size	Calcium (mg)	Calories
Dairy foods			
Milk (2% milk fat)	1 cup	271	122
Cottage cheese (2% milk fat)	1 cup	156	203
Mozzarella cheese (part skim, low moisture)	1 oz	222	72
Cheddar cheese (natural, not processed)	1.5 oz	303	170
Cream cheese (regular, plain)	1 oz	23	99
Yogurt (plain, skim milk)	8 oz	452	127
Nondairy foods			
Tofu (firm, only if processed with calcium sulfate)	1/2 cup	861	183
Sardines (with bones, in oil, drained)	3 oz	324	177
Salmon (pink, with bones, in water, drained)	3 oz	181	118
Orange juice (calcium fortified)	1 cup	253	137
Broccoli (fresh, steamed)	1 cup	88	19
Kale (scotch, fresh, chopped, steamed)	1 cup	172	36

What are some lifestyle recommendations to reduce the risk of osteoporosis?

The National Osteoporosis Foundation¹ recommends taking the following steps to reduce risk of osteoporosis:

- Consume adequate amounts of calcium and Vitamin D
- Participate in weight-bearing and muscle strengthening exercises such as walking, jogging, weight training, or aerobics
- Eat fruits, vegetables, and other foods that are good for bone health
- Avoid smoking and excessive drinking



During menopause, it is important for a woman to consult her physician to determine the most appropriate test of bone density, and to assess whether or not hormone replacement therapy (HRT) or estrogen replacement therapy (ERT) is needed. Replacement therapies are an effective preventative tool early in menopause, when calcium loss is greatest.⁷ Although HRT and ERT help reduce osteoporosis risk, they are not advised for all women because of their links to breast cancer and cardiovascular disease (and their other effects if used long term). Therefore, these options should be discussed individually with one's physician.

Where can more information be found?

If an individual has personal concerns about osteoporosis, they should discuss them with a physician. General information on osteoporosis prevention, treatment, and patient advocacy is available at the following web sites:

National Osteoporosis Foundation, www.nof.org.

Osteoporosis Society of Canada, www.osteoporosis.ca.

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