

Bone Health

Maintaining good bone health is important. You can prevent osteoporosis from developing with good nutrition and lifestyle management strategies. Osteoporosis is a condition in which bones become weak and fragile resulting in bone fractures. Some surgeries, cancer treatments, medicines or physical inactivity can increase your chances of bone loss or osteoporosis.

Risk Factors

The risk factors for bone loss include:

- Gender – women are 4 times more likely to be affected than men
- Aging
- Lack of exercise (sedentary lifestyle)
- Use of tobacco products
- Excess alcohol use
- Medicines
 - Steroids
 - Hormones
 - Blood thinners
 - Anticonvulsants
 - Certain chemotherapy medicines
- Menopause or early menopause in younger women
- Low testosterone in men (hypogonadism)
- Calcium or vitamin D deficiency
- Abnormal absorption of nutrients in the digestive tract following surgery
- History of fracture
- Other diseases such as:
 - Hyperparathyroidism
 - Hyperthyroidism
 - Multiple myeloma
 - Cushing's syndrome

Symptoms

Most people do not know they have osteoporosis until they break a bone. The bones of the hips, spine and wrists have the greatest risk of fracture.

Diagnostic Testing

The diagnostic test used for measuring bone mass is an x-ray called a bone densitometry. It is also referred to as a bone mineral density (BMD) test. The test is usually done when a woman reaches menopause. This serves as a baseline to compare and track any bone loss over a period of time. Bone mineral density is also measured before or during cancer treatment.

Prevention

Good bone health may prevent osteoporosis.

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To keep your bones healthy, follow these tips:

- Take in the recommended amount of calcium and vitamin D each day
- Exercise regularly
- Stop smoking
- Limit caffeine and alcohol

Calcium and Vitamin D

Calcium is needed for bone formation. Vitamin D helps your body absorb calcium from food and supplements. The recommended daily intake of calcium and vitamin D depends on several factors. Blood tests can tell us how much calcium and vitamin D is in the body but does not determine how much your body needs to keep your bones strong. The recommended dietary allowance (RDA) is based on a person's age and sex. Talk with your doctor or registered dietitian to determine the right amount of calcium and vitamin D for you.

Calcium

The recommended amount of calcium should be met from your diet and (if needed) supplements combined. Your doctor may recommend more or less depending on your needs. Eating a well- balanced diet is the best way to obtain the right amount of calcium. You should not consume more than 1,500 mg of calcium each day.

Recommended Dietary Allowance for Calcium Each Day (mg)

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Age	Male	Female
14-18 years	1,300 mg	1,300 mg
19-50 years	1,000 mg	1,000 mg
51-70 years	1,000 mg	1,200 mg
71+ years	1,200 mg	1,200 mg

Calcium Content of Foods in Milligrams (mg)		
Food	Serving Size	Calcium (mg)
Almond milk (calcium enriched)	1 cup	450
Buttermilk	1 cup	280
Cereal, calcium fortified	1 cup	100-1000
Cheese (cheddar, mozzarella, Swiss)	1 ounce	200

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Cottage cheese	1 cup	140
Canned fish with bones (salmon and sardines)	3 ounces	180-325
Green leafy vegetables, cooked (turnip, kale, or collard)	½ cup	50-100
Ice cream	½ cup	85
Juice (calcium fortified)	1 cup	260
Milk	1 cup	275-300
Milk (high protein, such as Mootopia®, Fairlife®)	1 cup	300-450
Soy milk (calcium enriched)	1 cup	300
Tofu made with calcium sulfate	½ cup	135-250
Yogurt, plain (low-fat)	1 cup	415
Yogurt, frozen	½ cup	100

Vitamin D

The recommended dietary allowance for Vitamin D is 600 to 800 international units (IU) per day. However, many people need more to reach a healthy blood level of vitamin D. Normal blood levels of vitamin D (25-OH vitamin D or 25-hydroxyvitamin D) are 30 to 100 ng/mL. Some experts recommend a blood level no greater than 60 ng/mL.

The major food sources of vitamin D are fatty fish (salmon, tuna and mackerel), cod liver oil, and vitamin D fortified foods (milk, milk substitutes, juice and cereal products). Also, sun exposure of about 20 minutes a day will cause the skin to make vitamin D.

Supplements

If you do not get enough calcium or vitamin D from food, you can take an over-the-counter supplement. The recommended amount of calcium and vitamin D comes from your diet and supplements combined. You should not take in more than 1,500 mg of calcium each day or more than 4,000 IU of vitamin D each day unless instructed or prescribed by your care team.

When taking calcium supplements, consider the following:

- There are different forms of calcium supplements including: carbonate, citrate, gluconate, and lactate.
- Calcium carbonate supplements should be taken with food for best absorption. Calcium carbonate may cause side effects such as constipation, bloating or nausea. If you have these side effects, look for a supplement made with calcium citrate. It is milder on your stomach.

- If you have had an operation on your stomach or intestine, you should use calcium citrate. It may be taken with or without food.
- The body does not well absorb more than 500 to 600 mg at a time. It is recommended to take no more than 500 to 600 mg of calcium (from food and supplements) at one time. If you need to supplement with more than 500 to 600 mg per day, take half of your dose in the morning and half in the evening.
- Make sure to look at the label on your supplement to decide how many pills are in the serving to provide the amount of calcium listed.
- Calcium supplements can interfere with iron absorption. Take iron and calcium supplements at least 2 hours apart. Calcium citrate supplements may be taken between meals to avoid interference with absorbing iron from food.

There are 2 main types of vitamin D:

- Vitamin D2 – Ergocalciferol
- Vitamin D3 – Cholecalciferol

Both forms are considered equally as effective.

Medicines

Prescription medicines may stop or slow bone loss and reduce the risk of bone fractures. Some of these medicines are listed below.

Alendronate (Fosamax®) is approved for both the prevention (5 mg per day or 35 mg once a week) and treatment (10 mg per day or 70 mg once a week) of postmenopausal osteoporosis. Alendronate reduces bone loss, increases bone density, and reduces the risk of spine, wrist and hip fractures.

Denosumab (Prolia®) is approved for the treatment of postmenopausal osteoporosis and for cancer treatment-related bone loss. Denosumab reduces bone loss and increases bone density. This can lower the risk for fracture. It is given as an injection under the skin every 6 months

Ibandronate (Boniva®) is approved for the treatment of postmenopausal osteoporosis. This medicine is taken once a month (150 mg).

Parathyroid hormone or teriparatide (Forteo®) is approved for postmenopausal women and men who are at high risk for a fracture. It promotes new bone growth and greatly increases bone mineral density. Forteo is self-administered as a daily injection for up to 24 months.

Parathyroid hormone or abaloparatide (Tymlos®) is approved for postmenopausal women who are at high risk for a fracture. It promotes new bone growth and greatly increases bone mineral density. Tymlos is self-administered as a daily injection for up to 24 months.

Raloxifene (Evista®) is approved for the prevention and treatment of postmenopausal osteoporosis. Raloxifene increases bone mass and reduces the risk of spine fractures.

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Risedronate (Actonel®) is approved for the prevention and treatment of postmenopausal osteoporosis. Taken daily (5 mg dose), weekly (35 mg dose) or monthly (150 mg dose), the medicine slows bone loss, increases bone density and reduces the risk of spine and non-spine fractures.

Romosozumab (Evenity®) is approved for the treatment of osteoporosis in postmenopausal women at high risk for fracture who have failed or are not able to tolerate other available osteoporosis medicines. It promotes bone formation and decreases bone resorption. It is given as 2 injections by your health care provider once per month for 1 year. It is usually followed by a medicine to prevent further bone breakdown.

Zoledronic Acid (Reclast®) is approved for the treatment of postmenopausal osteoporosis. It is the a once-a-year medicine, given by infusion in your doctor's office. Reclast® increases bone density and reduces the risk of spine, wrist and hip fractures.

Lifestyle Changes

Exercise

Check with your doctor before starting any new exercise routine, especially if you have been diagnosed with osteoporosis. Exercise helps build or maintain muscles to help support your bones during movement and prevent loss of calcium from bones. Exercise guidelines recommend individuals engage in moderate-intensity aerobic exercise at least 150 total minutes per week (or 75 minutes per week of vigorous-intensity activity). Muscle-strengthening activities are recommended at least 2 days/week.

To help build and maintain bones, weight-bearing aerobic exercises and muscle-strengthening exercises are recommended and to be spread across at least 4 days a week.

Examples of Aerobic Weight Bearing Exercises	
High-Impact Exercises	Low-Impact Exercises
<ul style="list-style-type: none">• Aerobics (high-impact)• Dancing• Hiking• Jogging/running• Jumping rope• Stair climbing (real stairs)• Tennis	<ul style="list-style-type: none">• Aerobics (low-impact)• Using elliptical training machines• Using stair-step machines• Walking fast on a treadmill or outside• Yoga or tai chi
Swimming and bicycling are not weight bearing exercises though they are good aerobic exercises, they do not help with bone health.	

Muscle-Strengthening Exercises

Resistance exercise will improve bone and muscle strength. These activities include weight lifting, such as using free weights and weight machines. Muscle-strengthening activities are

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recommended at least 2 days/week. For bone health, it is recommended that the activity be at 80% of maximal effort – usually 8 to 10 reps - if the weight can be lifted more than 15 times, increase the weight.

If you have severely low platelet counts or are severely anemic, talk with your doctor before starting or continuing with your exercise program. If you have been diagnosed with a fracture due to osteoporosis, speak with your care team before starting an exercise program.

Other Lifestyle Factors

Tobacco

Tobacco products such as cigarettes and smokeless tobacco lead to poor bone health. Avoid using tobacco products. If you currently use tobacco products, consider quitting. Call MD Anderson's Tobacco Treatment Program for help with quitting at 866-245-0862.

Alcohol

Limiting alcohol can improve bone health. Currently there is not a recommended limit on alcohol consumption for bone health. However, to reduce your cancer risk, it is recommended that men consume no more than 2 drinks per day. Women should consume no more than 1 drink per day. A drink of alcohol is:

- 12 ounces of regular beer
- 5 ounces of wine
- 1½ ounces of hard liquor

Caffeine

Caffeine may affect the amount of calcium that is absorbed and used by your body. You may want to consider limiting the amount of caffeine you consume.

For additional information about bone health, click on the links below:

National Osteoporosis Foundation

www.nof.org

International Osteoporosis Foundation

<http://www.osteofound.org>

Exercise is Medicine – American College of Sports Medicine

www.exerciseismedicine.org

Calcium Calculator-estimate your daily intake of calcium from all sources

<https://www.iofbonehealth.org/calcium-calculator>