



PATIENT & CAREGIVER EDUCATION

Osteoporosis, Osteopenia, and How to Improve Your Bone Health

This information explains what osteopenia and osteoporosis are and how you can improve your bone health.

About osteopenia and osteoporosis

Aging, menopause, and some medicines and health conditions can cause bone loss. This makes your bones weaker and more likely to fracture (break). When bone density is below the normal range, it's called osteopenia or osteoporosis, based on how much bone loss you have.

Osteopenia can sometimes lead to osteoporosis. People can protect their bone health by changing their lifestyle habits, following a healthy diet, and taking medicines, if needed.

Osteopenia (OS-tee-oh-PEE-nee-uh) is when your bone mass or bone mineral density is lower than normal. Bone mineral density is a measure of how dense bones are, and how strong they are.

Osteoporosis (OS-tee-oh-puh-ROH-sis) is when you have less bone tissue, and it's thinner. Your bones become weak and more likely to fracture.

Osteoporosis is often called a silent disease because there are no signs or symptoms. However, as your bones become weaker, you may develop:

- Loss of height over time
- Bent-over posture or a curved upper back
- Broken bones that happen more easily than expected, such as after a minor

injury, or when doing everyday activities. These fractures often happen in the spine or hips.

- Back pain caused by a compression fracture or collapsed vertebra (bone in your back).

There are 2 kinds of osteoporosis:

- Primary osteoporosis is caused by the normal process of aging, menopause (permanent end of menstrual cycles), or both.
- Secondary osteoporosis can start as a side effect of certain conditions or medicines. This includes medicine used to treat cancer, such as chemotherapy and endocrine therapy. This kind of osteoporosis may get better once you stop taking the medicine that causes it.

Causes and risk factors of osteopenia and osteoporosis

Your body is always making new bone and killing off old bone. Bone loss starts when your body makes less bone than it gets rid of.

Your lifestyle can raise your chance of getting osteopenia or osteoporosis.

Examples are:

- Lack of exercise
- Eating a diet low in nutrients, especially calcium and vitamin D
- Eating a diet high in sodium
- Drinking too much alcohol (more than 2 drinks per day for women or 3 drinks per day for men)
- Having too much caffeine (such as more than 3 cups of coffee a day)
- Smoking

Other causes of bone loss are:

Some cancer treatments:

Treatments include chemotherapy and hormonal therapy.

Breast cancer treatments can affect bone health. Research compared people who had breast cancer with those who never had breast cancer. People who had breast cancer had a much higher chance of getting osteoporosis or osteopenia.

Chemotherapy can lead to bone loss, osteopenia, or osteoporosis. Some chemotherapy drugs can cause early menopause.

Hormonal therapy for breast cancers:

Tamoxifen can stop estrogen from making cancer cells grow. In younger women, tamoxifen may cause some bone loss. In older women who already have gone through menopause, tamoxifen may improve bone density.

Aromatase inhibitors include letrozole, anastrozole, and exemestane. They're a group of drugs that stop the body from making estrogen. Side effects of aromatase inhibitors include a loss of bone density.

Ovarian suppression stops your ovaries from making estrogen. With less estrogen, some cancer cells do not grow. A side effect of this treatment is loss of bone density. If you have surgery to remove your ovaries, you're at higher risk for osteoporosis.

Radiation therapy kills cancer cells. It may also cause some bone loss. Your ribs are at risk if they were exposed to radiation during treatment.

Other conditions that can cause bone loss are:

- Bone marrow or connective tissue disorders.
- Diseases that affect levels of hormones, such as estrogen and testosterone.
- Thyroid disorders.
- Parathyroid disorders.
- Conditions that create trouble absorbing food and nutrients. Examples are graft versus host disease in your digestive tract, Crohn's disease, or

ulcerative colitis.

- Some medicines, such as corticosteroids, heparin, some anticonvulsants, proton pump inhibitors, and methotrexate.
- Hormonal therapy for prostate (androgen deprivation therapy) and breast cancers (aromatase inhibitors).
- Going through menopause or taking medicines such as leuprolide (Lupron®) or goserelin (Zoladex®). These drugs stop ovaries from making estrogen, or stop testicles from making testosterone.
- Radiation therapy.
- Being on long-term bed rest and not being active.
- Being over 65 years old.
- Having a small frame or low body weight.
- Being of Caucasian or Asian ethnicity.

Diagnosing osteopenia or osteoporosis

Your doctor may think you're at risk for osteopenia or osteoporosis. They'll recommend you have a bone density test. This test measures bone density in your wrist, spine, and hip. It's a painless test that's like an X-ray but uses much less radiation.

Preventing and managing osteopenia or osteoporosis

There are things you can do to lower your risk of osteoporosis and your risk for fractures.

Lifestyle changes

You can make changes in your lifestyle.

- If you smoke or use tobacco products, try to quit. MSK has specialists who can help you quit smoking. For more information about our Tobacco Treatment Program, call 212-610-0507.

- Limit your how much alcohol you drink. Do not have more than 2 drinks a day if you're a woman and 3 drinks a day if you're a man.
- Exercise regularly. For more information, read the “Exercise for Strong Bones” section in this resource.
 - Your doctor may recommend exercises to strengthen your bones and muscles. These may be weight-bearing exercises that help increase bone density. Examples are walking, jogging, and running.
 - Strengthening exercises. Examples are lifting small weights, or strengthening the muscles in your lower back and abdomen (belly).
 - Balance exercises, such as yoga or Pilates, can also improve your strength and flexibility.
 - Always talk with your doctor before starting a new exercise routine. If you have trouble starting an exercise routine, talk with your doctor about whether physical therapy (PT) is right for you.
- Make sure you have enough calcium and vitamin D in your diet.
 - Most adults need 1,300 milligrams (mg) of calcium every day. Your doctor or clinical dietitian nutritionist can tell you how much calcium is right for you. The best way to get calcium is through food (see the table “Foods Rich in Calcium”).
 - If you do not get enough calcium from your diet, you may need to take a calcium supplement. Calcium supplements come in a few forms, including calcium carbonate and calcium citrate.
 - Your body also needs vitamin D to absorb and use calcium. Most adults with osteopenia or osteoporosis need at least 800 international units (IU) of vitamin D daily. How much vitamin D you need may be different. Your doctor or clinical dietitian nutritionist can tell you how much vitamin D is right for you. Although the main source of vitamin D is the sun, you can also get it from food (see the table “Foods Containing Vitamin D”). Your healthcare provider can check your vitamin D levels with a simple blood test.
 - If you're not getting enough vitamin D, you may need to take a

vitamin D supplement. You can buy vitamin D supplements at your pharmacy without a prescription.

- If you have low levels of vitamin D, your doctor may recommend you take prescription supplements with higher amounts of vitamin D. This can bring your levels up to normal.
- Talk with your doctor about medicines and hormone therapy treatments.
 - There are prescription medicines that can help prevent and treat osteoporosis. Your doctor will talk with you about your options and prescribe the one best for you. They'll go over any instructions for taking your medicine.
 - Medicine and hormones that treat osteoporosis include:
 - Oral medicines, such as risedronate (Actonel®) and alendronate (Fosamax®), that you take by mouth.
 - Injectable medicines, such as denosumab (Prolia®) or romozosomab (Evenity™), that you get as a shot.
 - Intravenous (IV) medicine, such as zoledronic acid (Reclast®), that you get into your vein in your arm.
 - Hormone therapies, including calcitonin, parathyroid hormone type injections (such as Forteo® and Tymlos®), and estrogen replacement therapy.
- Prevent falls.
 - Make your home safe to prevent falls. Here are some things you can do:
 - Remove throw rugs or attach them to the floor.
 - Install safety rails on stairs and grab bars in your shower or tub.
 - Apply nonskid tape or decals to your shower or tub floor.
 - Make sure the rooms in your house or apartment are well lit.
 - Wear sturdy shoes.
 - Stand up slowly after sitting or lying down, so that your body can adjust to the new position.

- Use a cane or walker to improve your balance.
- When you bend over, bend at your knees, not at your waist.
- For more information about preventing falls, read the resource *What You Can Do to Avoid Falling* (www.mskcc.org/pe/avoid_falling).

Exercise for strong bones

Exercise can help you keep bones strong. It can also lower your risk for falls and fractures.

Talk with your healthcare provider before starting any exercise program.

High-impact weight-bearing exercises help build up your bones and keep them strong. Examples of high-impact weight-bearing exercises are:

- Fast dancing
- High-impact aerobics
- Hiking
- Jogging or running
- Jumping rope
- Climbing stairs
- Tennis

Low-impact weight-bearing exercises can also help keep bones strong. They're also safer for people who cannot do high-impact exercises. Examples of low-impact weight-bearing exercises are:

- Using elliptical training machines
- Walking
- Using a climbing machine, such as a StairMaster®
- Riding a bicycle
- Rowing

- Tai chi
- Yoga
- Pilates
- Swimming
- Water aerobics
- Golf
- Cross-country skiing
- Ballroom dancing

Foods rich in calcium

Be sure to check the product labels, because the amount of calcium can vary.

Food	Portion size	Calcium in portion (milligrams)	Calories in portion
Dairy foods			
Yogurt, plain, nonfat	1 cup (8 ounces)	265	150
Cheddar cheese	1½ ounces	307	171
Gruyere cheese	1½ ounces	430	176
Parmesan cheese	1½ ounces	503	167
Milk, low-fat	1 cup (8 ounces)	305	102
Milk, whole	1 cup (8 ounces)	276	149
Non-dairy alternatives			
Soy milk, plain, calcium-fortified	1 cup (8 ounces)	301	80
Rice milk, plain, calcium-fortified	1 cup (8 ounces)	283	113

Almond milk, vanilla, calcium-fortified	1 cup (8 ounces)	451	91
Seafood			
Sardines, canned in oil, with bones, drained	2 sardines	92	50
Salmon, sockeye, canned, drained	4 ounces	263	189
Ocean perch, Atlantic, cooked	4 ounces	39	109
Mussels, steamed	4 ounces	37	195
Fruits and vegetables			
Collards, cooked	½ cup	134	31
Turnip greens, cooked	½ cup	104	29
Kale, cooked	½ cup	47	18
Bok choy (Chinese cabbage), raw	1 cup	74	9
Brussels sprouts	½ cup	28	28
Figs, fresh	2 medium figs	35	74
Nuts, beans, and soy			
Almonds	¼ cup	96	207
White beans, canned	½ cup	96	150
Edamame (soybeans), prepared	½ cup	49	95
Tofu, firm, prepared with calcium sulfate*	½ cup	253	88
Other foods and beverages			
Fortified, ready-to-eat cereals (various)	¾ cup to 1 cup	250-1,000	100-210
Orange juice, calcium fortified	1 cup	500	117
Oatmeal, plain, instant, fortified	1 packet prepared	98	101
Mineral water (e.g., San Pellegrino®, Perrier®)	1 cup (8 ounces)	33	0
Basil, dried	1 teaspoon	31	3

*Calcium content is for tofu processed with a calcium salt. Tofu processed with other salts does not really give you calcium.

Source: USDA National Nutrient Database for Standard Reference

Available at: <http://fdc.nal.usda.gov>

Foods that have Vitamin D

Be sure to check the product labels, because the amount of Vitamin D can vary.

Food	Portion size	Vitamin D in portion (IU)	Calories in portion
Cod liver oil	1 tablespoon	1,360	123
Salmon, sockeye, canned, drained	4 ounces	953	189
Ocean perch, Atlantic, cooked	4 ounces	66	109
Tuna fish, light, canned in water, drained	4 ounces	53	97
Sardines, canned in oil, drained	2 sardines	46	50
Orange juice fortified with vitamin D	1 cup (8 ounces)	100	117
Milk, low-fat vitamin D fortified	1 cup (8 ounces)	117	102
Egg, including yolk	1 large egg	44	78
Shitake mushrooms, dried	4 mushrooms	23	44
Chanterelle mushrooms, raw	½ cup	114	21

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Available at: <http://fdc.nal.usda.gov>

Additional Resources

National Osteoporosis Foundation

www.nof.org

Provides resources and information on osteoporosis and improving bone health.

If you have questions or concerns, contact your healthcare provider. A member of your care team will answer Monday through Friday from 9 a.m. to 5 p.m. Outside those hours, you can leave a message or talk with another MSK provider. There is always a doctor or nurse on call. If you're not sure how to reach your healthcare provider, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

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