



Diseases and Conditions

Osteoporosis

By Mayo Clinic Staff

Osteoporosis causes bones to become weak and brittle — so brittle that a fall or even mild stresses like bending over or coughing can cause a fracture. Osteoporosis-related fractures most commonly occur in the hip, wrist or spine.

Bone is living tissue that is constantly being broken down and replaced. Osteoporosis occurs when the creation of new bone doesn't keep up with the removal of old bone.

Osteoporosis affects men and women of all races. But white and Asian women — especially older women who are past menopause — are at highest risk. Medications, healthy diet and weight-bearing exercise can help prevent bone loss or strengthen already weak bones.

There typically are no symptoms in the early stages of bone loss. But once bones have been weakened by osteoporosis, you may have signs and symptoms that include:

- Back pain, caused by a fractured or collapsed vertebra
- Loss of height over time
- A stooped posture
- A bone fracture that occurs much more easily than expected

When to see a doctor

You may want to talk to your doctor about osteoporosis if you went through early menopause, took corticosteroids for several months at a time, or either of your parents had hip fractures.

Your bones are in a constant state of renewal — new bone is made and old bone is broken down. When you're young, your body makes new bone faster than it breaks down old bone and your bone mass increases. Most people reach their peak bone mass by their early 20s. As people age, bone mass is lost faster than it's created.

How likely you are to develop osteoporosis depends partly on how much bone mass you attained in your youth. The higher your peak bone mass, the more bone you have "in the

bank" and the less likely you are to develop osteoporosis as you age.

A number of factors can increase the likelihood that you'll develop osteoporosis — including your age, race, lifestyle choices, and medical conditions and treatments.

Unchangeable risks

Some risk factors for osteoporosis are out of your control, including:

- **Your sex.** Women are much more likely to develop osteoporosis than are men.
- **Age.** The older you get, the greater your risk of osteoporosis.
- **Race.** You're at greatest risk of osteoporosis if you're white or of Asian descent.
- **Family history.** Having a parent or sibling with osteoporosis puts you at greater risk, especially if your mother or father experienced a hip fracture.
- **Body frame size.** Men and women who have small body frames tend to have a higher risk because they may have less bone mass to draw from as they age.

Hormone levels

Osteoporosis is more common in people who have too much or too little of certain hormones in their bodies. Examples include:

- **Sex hormones.** Lowered sex hormone levels tend to weaken bone. The reduction of estrogen levels at menopause is one of the strongest risk factors for developing osteoporosis. Women may also experience a drop in estrogen during certain cancer treatments. Men experience a gradual reduction in testosterone levels as they age. And some treatments for prostate cancer reduce testosterone levels in men.
- **Thyroid problems.** Too much thyroid hormone can cause bone loss. This can occur if your thyroid is overactive or if you take too much thyroid hormone medication to treat an underactive thyroid.
- **Other glands.** Osteoporosis has also been associated with overactive parathyroid and adrenal glands.

Dietary factors

Osteoporosis is more likely to occur in people who have:

- **Low calcium intake.** A lifelong lack of calcium plays a major role in the development of osteoporosis. Low calcium intake contributes to diminished bone density, early bone loss and an increased risk of fractures.
- **Eating disorders.** People who have anorexia are at higher risk of osteoporosis. Low food intake can reduce the number of calories and amount of protein and calcium ingested. In women, anorexia can stop menstruation, leading to weaker bones. In men, anorexia lowers the amount of sex hormones in the body and can weaken bone.
- **Gastrointestinal surgery.** A reduction in the size of your stomach or a bypass or

removal of part of the intestine limits the amount of surface area available to absorb nutrients, including calcium.

Steroids and other medications

Long-term use of oral or injected corticosteroid medications, such as prednisone and cortisone, interferes with the bone-rebuilding process. Osteoporosis has also been associated with medications used to combat or prevent:

- Seizures
- Gastric reflux
- Cancer
- Transplant rejection

Lifestyle choices

Some bad habits can increase your risk of osteoporosis. Examples include:

- **Sedentary lifestyle.** People who spend a lot of time sitting have a higher risk of osteoporosis than do those who are more active. Any weight-bearing exercise and activities that promote balance and good posture are beneficial for your bones, but walking, running, jumping, dancing and weightlifting seem particularly helpful.
- **Excessive alcohol consumption.** Regular consumption of more than two alcoholic drinks a day increases your risk of osteoporosis.
- **Tobacco use.** The exact role tobacco plays in osteoporosis isn't clearly understood, but it has been shown that tobacco use contributes to weak bones.

Bone fractures, particularly in the spine or hip, are the most serious complication of osteoporosis. Hip fractures often result from a fall and can result in disability and even death from postoperative complications, especially in older adults.

In some cases, spinal fractures can occur even if you haven't fallen. The bones that make up your spine (vertebrae) can weaken to the point that they may crumple, which can result in back pain, lost height and a hunched forward posture.

Your family doctor may suggest bone density testing because screening for osteoporosis is recommended for all women by age 65. Some guidelines also recommend screening men by age 70, especially if they have health issues likely to cause osteoporosis.

If the bone density test is very abnormal or you have other complex health issues, such as kidney dysfunction, you may be referred to a doctor who specializes in metabolic disorders (endocrinologist) or a doctor who specializes in diseases of the joints, muscles or bones (rheumatologist).

Here's some information to help you get ready for your appointment, and what to expect from your doctor.

What you can do

- **Write down any symptoms you've noticed**, though it's possible you may not have any.
- **Write down key personal information**, including any major stresses or recent life changes.
- **Make a list of all medications**, vitamins and supplements that you're currently taking or have taken in the past. It's especially helpful if you record the type and dose of calcium and vitamin D supplements, because many different preparations are available. If you're not sure what information your doctor might need, take the bottles with you.
- **Write down questions to ask** your doctor.

Your time with your doctor is limited, so preparing a list of questions can help you make the most of your time together. List your questions from most important to least important in case time runs out. For osteoporosis, some basic questions to ask your doctor include:

- Do I need to be screened for osteoporosis?
- What kinds of tests do I need to confirm the diagnosis?
- What treatments are available, and which do you recommend?
- What types of side effects can I expect from treatment?
- Is there a generic alternative to the medicine you're prescribing me?
- Are there any alternatives to the primary approach that you're suggesting?
- I have other health conditions. How can I best manage them together?
- Are there any activity restrictions that I need to follow?
- Do I need to make changes in my diet?
- Do I need to take supplements?
- Is there a physical therapy program that would benefit me?
- What can I do to prevent falls?

In addition to the questions that you've prepared to ask your doctor, don't hesitate to ask questions during your appointment at any time that you don't understand something.

What to expect from your doctor

Your doctor is likely to ask you a number of questions. Being ready to answer them may reserve time to go over any points you want to spend more time on. Your doctor may ask:

- Have you experienced any fractures or broken bones?
- Have you noticed a loss of height?
- How is your diet, especially dairy intake? Do you think you get enough calcium?

Vitamin D?

- Do you take any vitamins or supplements?
- How often do you exercise?
- Did you exercise more or less in the past?
- Does either of your parents have osteoporosis?
- Has anyone in your family had bone fractures, especially hip fractures?
- Have you ever had stomach or intestinal surgery?
- Do you have chronic diarrhea?
- Have you taken corticosteroid medications (prednisone, cortisone) as pills, injections, suppositories or creams?

Your bone density can be measured by a machine that uses low levels of X-rays to determine the proportion of mineral in your bones. During this painless test, you lie on a padded table as a scanner passes over your body. In most cases, only a few bones are checked — usually in the hip, wrist and spine.

Treatment recommendations are based on an estimate of your risk of breaking a bone in the next 10 years using information such as the bone density test. If the risk is not high, treatment might not include medication and might focus instead on lifestyle, safety and modifying risk factors for bone loss.

For both men and women at increased risk of fracture, the most widely prescribed osteoporosis medications are bisphosphonates. Examples include:

- Alendronate (Fosamax)
- Risedronate (Actonel, Atelvia)
- Ibandronate (Boniva)
- Zoledronic acid (Reclast)

Side effects include nausea, abdominal pain, difficulty swallowing, and the risk of an inflamed esophagus or esophageal ulcers. These are less likely to occur if the medicine is taken properly. Intravenous forms of bisphosphonates don't cause stomach upset. And it may be easier to schedule a quarterly or yearly injection than to remember to take a weekly or monthly pill, but it can be more costly to do so.

Using bisphosphonate therapy for more than five years has been linked to a rare problem in which the middle of the thighbone cracks and might even break completely. Bisphosphonates also have the potential to affect the jawbone. Osteonecrosis of the jaw is a rare condition that can occur after a tooth extraction in which a section of jawbone dies and deteriorates. You should have a recent dental examination before starting bisphosphonates.

Hormone-related therapy

Estrogen, especially when started soon after menopause, can help maintain bone density. However, estrogen therapy can increase a woman's risk of blood clots, endometrial cancer, breast cancer and possibly heart disease. Therefore, estrogen is typically used for bone health only if menopausal symptoms also require treatment.

Raloxifene (Evista) mimics estrogen's beneficial effects on bone density in postmenopausal women, without some of the risks associated with estrogen. Taking this drug may also reduce the risk of some types of breast cancer. Hot flashes are a common side effect. Raloxifene also may increase your risk of blood clots.

In men, osteoporosis may be linked with a gradual age-related decline in testosterone levels. Testosterone replacement therapy can help increase bone density, but osteoporosis medications have been better studied in men with osteoporosis and are recommended alone or in addition to testosterone.

Other osteoporosis medications

If you can't tolerate the more common treatments for osteoporosis — or if they don't work well enough — your doctor might suggest trying:

- **Denosumab (Prolia).** Compared with bisphosphonates, denosumab produces similar or better bone density results and reduces the chance of all types of fractures. Denosumab is delivered via a shot under the skin every six months. The most common side effects are back and muscle pain.
- **Teriparatide (Forteo).** This powerful drug is similar to parathyroid hormone and stimulates new bone growth. It's given by injection under the skin. After two years of treatment with teriparatide, another osteoporosis drug is taken to maintain the new bone growth. This drug is reserved for patients with severe osteoporosis.

These suggestions may help reduce your risk of developing osteoporosis or experiencing broken bones:

- **Don't smoke.** Smoking increases rates of bone loss and the chance of experiencing a fracture.
- **Avoid excessive alcohol.** Consuming more than two alcoholic drinks a day may decrease bone formation. Being under the influence also can increase your risk of falling.
- **Prevent falls.** Wear low-heeled shoes with nonslip soles and check your house for electrical cords, area rugs and slippery surfaces that might cause you to trip or fall. Keep rooms brightly lit, install grab bars just inside and outside your shower door, and make sure you can get into and out of your bed easily.

Three factors essential for keeping your bones healthy throughout your life are:

- Adequate amounts of calcium
- Adequate amounts of vitamin D

- Regular exercise

Calcium

Men and women between the ages of 18 and 50 need 1,000 milligrams of calcium a day. This daily amount increases to 1,200 milligrams when women turn 50 and men turn 70.

Good sources of calcium include:

- Low-fat dairy products (200 to 300 milligrams per serving)
- Dark green leafy vegetables
- Canned salmon or sardines with bones
- Soy products, such as tofu
- Calcium-fortified cereals and orange juice

If you find it difficult to get enough calcium from your diet, consider taking calcium supplements. However, too much calcium has been linked to heart problems and kidney stones. The Institute of Medicine recommends that total calcium intake, from supplements and diet combined, should be no more than 2,000 milligrams daily for people older than 50.

Vitamin D

Vitamin D improves your body's ability to absorb calcium. Many people get adequate amounts of vitamin D from sunlight, but this may not be a good source if you live in high latitudes, if you're housebound, or if you regularly use sunscreen or avoid the sun entirely because of the risk of skin cancer.

Scientists don't yet know the optimal daily dose of vitamin D. A good starting point for adults is 600 to 800 international units (IU) a day, through food or supplements. If your blood levels of vitamin D are low, your doctor may suggest higher doses. Teens and adults can safely take up to 4,000 international units (IU) a day.

Exercise

Exercise can help you build strong bones and slow bone loss. Exercise will benefit your bones no matter when you start, but you'll gain the most benefits if you start exercising regularly when you're young and continue to exercise throughout your life.

Combine strength training exercises with weight-bearing exercises. Strength training helps strengthen muscles and bones in your arms and upper spine, and weight-bearing exercises — such as walking, jogging, running, stair climbing, skipping rope, skiing and impact-producing sports — affect mainly the bones in your legs, hips and lower spine.

Swimming, cycling and exercising on machines such as elliptical trainers can provide a good cardiovascular workout, but because such exercises are low impact, they're not as helpful for improving bone health as weight-bearing exercises are. There is evidence that competitive cyclists have reduced bone mineral density. They should combine strength

training and weight-bearing exercises and consider a test for osteoporosis.

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Dec. 13, 2014

Original article: <http://www.mayoclinic.org/diseases-conditions/osteoporosis/basics/definition/con-20019924>

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