



www.arthritis.org
800-283-7800

Osteoporosis

WHAT IS OSTEOPOROSIS?

Osteoporosis (ah-stee-oh-po-RO-sis) is a disease that causes bones to weaken and have an increased risk of fracture. This can lead to rounded shoulders, loss of height and even painful fractures (broken bones). Osteoporosis itself is painless but the fractures that can occur because of it are painful. The word osteoporosis means bone (osteo) that is porous or filled with holes (porosis).

Osteoporosis is not the same as osteoarthritis (ah-stee-oh-ar-THRY-tis), or OA. OA is a common form of arthritis that affects the joints. In OA, cartilage that covers the joints breaks down, causing pain and stiffness. In osteoporosis, the bones become weak.

Osteoporosis is a serious health problem in the United States. It affects about 28 million people and results in more than 1.5 million fractures of the back, wrists and hips each year. Eighty percent of people with osteoporosis are women. It is the main cause of bone fractures in postmenopausal women and the elderly. You are more at risk for osteoporosis if you have a condition such as rheumatoid arthritis (ROO-

ma-toyd ar-THRY-tis) or lupus, or if you take glucocorticoid medications.

Bone is a changing, living tissue. It is a structure filled with calcium and mineral deposits. During a lifetime, bone goes through a process called remodeling. This means that the bone is broken down and replaced with strong, new bone. Up until ages 20 to 25, the calcium you get from food helps bone rebuild faster than it breaks down. When your bones are the strongest and reach the highest density they'll ever be, it is called peak bone mass. This usually happens by age 25.

By around age 40, bone mass begins to decline slowly. After menopause, women lose bone mass because of a drop in estrogen level. Over the next five to 10 years women can lose up to one-third of their bone mass. This is because bone breaks down faster than it can be replaced.

An early sign of osteoporosis is called osteopenia (ah-stee-oh-PEE-nee-ah), which means low bone. Osteopenia is detected by the studies that measure bone mass with measurements that are lower than normal but not low enough to be diagnosed as osteoporosis.



HEALTHY BONE



BONE WITH OSTEOPOROSIS

Osteoporosis makes bones less dense and more susceptible to fractures.

Bones that have less mass are more likely to break or fracture, even in a minor fall. In many people, the first warning sign of osteoporosis may be a broken bone. This is why osteoporosis is called a silent disease. However, bone loss occurs long before you have a fracture. Early detection and treatment is important because the chance of future fractures increases greatly after the first fracture. Spine fractures may result in a loss of height and rounded shoulders. This is called a “dowager’s hump.”

Tooth loss might be a warning sign that osteoporosis has affected the jawbone. About one-third of American women lose all their teeth by their late 60s.

RISK FACTORS

The amount of bone mass you have as a young adult and the rate at which you lose it as you age determine your risk for osteoporosis. It is more common in:

- women, especially those past menopause;
- women who go through menopause early (before age 45) or who have very irregular menstrual periods;
- people with thin or small frames;
- people with a family history of osteoporosis;
- people with a history of bone fractures after minor trauma (fractures that occur without a serious accident, such as falling);

- people with an inflammatory form of arthritis, such as rheumatoid arthritis or lupus (see page 5);
- people who take drugs that reduce bone strength such as glucocorticoids, anticonvulsants (seizure medications) or heparin;
- people who eat few calcium-rich foods, such as dairy foods;
- smokers;
- people who drink more than two alcoholic beverages a day;
- people who don’t exercise regularly; and
- men with low levels of testosterone.

If you have one or more of these risk factors, you are at greater risk of having osteoporosis and of breaking a bone. Talk to your doctor about ways to reduce your risk and about having your bone density tested.

Women are at greater risk of losing bone mass than men. This is because women have about 30 percent less bone mass than men at the time of their peak bone mass. In addition, women begin to lose bone mass rapidly at the time of menopause. However, age-related bone loss in both sexes plays a role in causing hip fractures in later life.

Research has shown that Caucasian and Asian women have less bone mass than African-American women, and are at greater risk of the disease. However, research shows that all women – regardless of ethnic background – are at risk for osteoporosis.

Inflammatory Arthritis and Osteoporosis

Inflammatory arthritis is a form of arthritis that causes inflammation in the lining of the joints and/or other internal organs. Having an inflammatory form of arthritis, such as rheumatoid arthritis or lupus, leads to the production

of substances that cause bone loss. This bone loss increases your risk of developing osteoporosis. The risks may be magnified because people with inflammatory arthritis:

- are typically women;
- may not exercise regularly; or
- may use glucocorticoid medications.

Each of these factors increases the risk of osteoporosis.

Glucocorticoids and Osteoporosis

People who take glucocorticoids are at greater risk for osteoporosis. Glucocorticoids (cortisone, prednisone) are powerful anti-inflammatory drugs used to treat some forms of arthritis. Glucocorticoids may cause bone loss and are the most common cause of drug-related osteoporosis. The amount of bone loss depends on the amount of medication and how long a person takes it.

For example, a dose of prednisone higher than 5 milligrams (mg) per day over several years can result in bone loss and an increased risk of fractures. Recent studies suggest that doses of prednisone of 5 mg or less may be associated with bone loss in some people. However, short-term treatments with prednisone (1 to 2 months) once or twice a year or a very low dose (1 to 4 mg per day) are less harmful to bone.

Glucocorticoids damage bone by increasing bone loss and decreasing new bone formation. They also decrease calcium absorption and estrogen levels.

If you take glucocorticoids, your risk of developing osteoporosis depends on how strong your bones are to begin with. You should have regular bone-density tests to determine your bone strength and how much you are losing.

You also should be tested for any other causes of bone loss that can be avoided. Talk to your doctor about osteoporosis prevention.

HOW TO PREVENT OSTEOPOROSIS

The keys to preventing osteoporosis are building strong bone and preventing bone loss. If your bones are strong to start with – both through genetics and lifestyle choices – you'll be less likely to have problems when bone loss does occur. Although you have no control over genetics, you can prevent or slow down osteoporosis by making smart lifestyle choices.

Before age 35, you can take the following steps to build as much bone mass as possible and help slow the rate of bone loss later in life.

Increase Your Calcium and Vitamin D Intake

A healthful diet is important in preventing osteoporosis. Calcium intake is important to prevent bone loss. Calcium intake not only affects bone density, but it also affects other body processes. Your body must have a certain level of calcium in your blood for muscle contraction, heartbeat and normal blood clotting. Because these functions take priority over calcium's role in bone density, the body draws calcium from the bones to keep blood levels normal when calcium intake isn't enough.

How much calcium you need depends on your sex, age and risk for osteoporosis. Most adults need 1,000 to 1,500 mg of calcium per day. Unfortunately, most women only get about half that amount from their diets. Getting enough calcium is especially important if you're a woman under age 35. This is because your body is still able to absorb and store calcium in your bones easily. Doctors recommend 1,500 mg per day for teenagers and pregnant or breast-feeding women.

As you age, your body absorbs and uses calcium less efficiently. Increasing your calcium intake to 1,500 mg is an important way to fix this after age 50.

Getting 400 to 800 IU (international units) of vitamin D daily also is important. Vitamin D increases the amount of calcium your body absorbs from your intestines. Your body produces vitamin D when exposed to sunlight. Good sources of vitamin D include:

- liver;
- fish oil;
- vitamin D-fortified milk; and
- multi-vitamin/mineral supplements.

FOODS AS CALCIUM SOURCES

Foods are the best sources of calcium. You can increase the amount of calcium in your diet by eating more dairy products. Milk, cheese and yogurt have the highest amounts of calcium. An eight-ounce glass of milk has about 300 mg. This is one-fourth of your daily calcium requirement. To avoid adding fat and calories to your diet, buy skim or low-fat dairy products that provide the same amounts of calcium as whole milk products.

If you are lactose intolerant, try lactase-treated dairy products. They will give you the same daily requirement of calcium. Other beverages, such as orange juice, are fortified with calcium.

Good Sources of Calcium

Other foods that are high in calcium include:

- dark green, leafy vegetables, such as turnip greens, kale and collards;
- sardines with the bones;
- brazil nuts;

- calcium-treated tofu (isoflavones found in tofu and other soy food might help fight bone loss);
- almonds; and
- calcium-fortified orange juice, breads and breakfast cereals.

CALCIUM AND VITAMIN D SUPPLEMENTS

If you do not like or cannot eat dairy foods, calcium supplements can make up for the calcium you don't get from food. Calcium supplements come in tablets or liquids.

There are different kinds of supplements. Calcium carbonate supplements contain the highest amount of useful, or elemental, calcium. You can increase calcium absorption by taking the calcium carbonate supplements with meals.

Calcium citrate and calcium gluconate supplements have less elemental calcium but may be easier for your body to absorb. They may be taken with or without meals.

Be sure to take calcium supplements with meals and drink six to eight glasses of water each day. Talk to your doctor about which supplement is best for you.

Vitamin D increases calcium absorption. Recent studies suggest that it also may increase muscle strength in the elderly, preventing falls that lead to fractures. Daily recommended vitamin D intake is 400 IU per day. Glucocorticoid users and the elderly should increase their intake to 800 IU.

Avoid Smoking

People who smoke have a greater risk of fracture than nonsmokers. Smoking reduces bone mass several ways. Calcium absorption is reduced in smokers. Women who smoke usually experience menopause at an earlier age, and smoking lowers women's estrogen levels. Finally, smok-

ing may lessen the benefits of estrogen therapy after menopause. These factors increase the risk for osteoporosis.

Avoid Heavy Alcohol Use

People who drink large amounts of alcohol have a higher risk of developing osteoporosis. This is because they have less bone mass and lose bone more quickly. This loss of bone mass may be the result of alcohol's effect on bone. Drinking also increases the chances of falling and breaking a bone.

If you drink alcohol, experts recommend no more than two alcoholic beverages per day to keep bones healthy. One alcoholic drink is equal to 12 ounces of beer, five ounces of wine or one-and-a-half ounces of liquor.

Exercise and Stay Active

Exercises or physical activity that place weight on your bones or increase the force of gravity against them can help you maintain bone mass. Weight-bearing exercise can strengthen bones in young adults. It also can maintain bone mass in middle-aged people. These activities include dancing, cross-country skiing, stair climbing, tennis and walking. Exercise also helps you move more easily and keep your balance, which helps you avoid falls. A form of exercise called tai chi (ty chee) emphasizes balance training and may be helpful in preventing falls.

Experts do not know exactly how long you must exercise to help prevent loss of bone mass because most exercise guidelines apply to heart health, not bone health. To gain the health benefits of exercise, do some type of weight-bearing exercise for 30 minutes most days of the week. You can exercise 10 or 15 minutes at a time if you have trouble doing it all at once. Check with

your doctor before starting an exercise program if you have not been physically active or if you have any of the following:

- osteoporosis or fractures after age 40;
- heart disease, high blood pressure, stroke, high cholesterol or a family history of heart disease;
- pain or pressure in the chest, neck, shoulder or arm during or after exercise;
- dizziness or extreme shortness of breath after mild exertion; or
- any condition that might need medical attention before an exercise program begins, such as diabetes.

Consider Taking Estrogen

After menopause, women lose bone mass when their ovaries stop producing the hormone estrogen. In addition to controlling menstrual periods, this hormone helps keep calcium in the bones and maintains bone mass. Lowered estrogen level is a major cause of osteoporosis in women after menopause.

Menopause usually begins around age 50, but it may start sooner. For example, having surgery to remove your ovaries will cause you to go through menopause. All women who have undergone menopause should discuss estrogen therapy with their doctor.

Estrogen replacement is one of the best ways for women to prevent fractures due to osteoporosis. It seems to work best during the first five to 10 years after menopause when the loss of bone mass is most rapid. However, it is helpful when taken any time after menopause begins. Long-term estrogen therapy can reduce the risk of fracture by as much as 50 percent.

Your doctor may suggest estrogen therapy if you:

- have started menopause;
- have taken drugs that weaken bones (glucocorticoids, anticonvulsants or heparin);
- have broken a bone because of osteoporosis; or
- have low bone mass.

Your doctor must prescribe estrogen. It is available in tablets, skin patches or injections. Taking estrogen may increase your risk for breast and uterine cancer. To reduce the risk of uterine cancer, your doctor may prescribe a combination of estrogen and progesterone (another hormone) especially for women who have not had hysterectomies.

Recent studies have shown that the combination of estrogen and progesterone is associated with an increased risk of cardiovascular complications, including:

- heart attacks;
- strokes; and
- blood clots in the lungs.

Women considering or using combination hormone replacement therapy for osteoporosis should discuss these risks with their doctor.

Estrogen therapy may cause side effects such as menstrual-like bleeding. Newer estrogen-like hormones may have fewer side effects. If you are taking estrogen, it is important to work closely with your doctor. Your doctor may not want you to take estrogen if you have a family or personal history of breast or uterine cancer, or a history of blood clots.

For people who cannot take estrogen, there are other medications that help to maintain bone mass and prevent fractures. These medications include alendronate, calcitonin and raloxifene. All of these drugs prevent fractures in the spine. Biphosphonate medications also prevent hip fractures.

OSTEOPOROSIS DIAGNOSIS

Since osteoporosis doesn't cause any symptoms, you may not even be aware you have it until you:

- break a bone;
- notice a loss in height; or
- find that your upper back bends forward.

However, your doctor can determine if you have osteoporosis or are at risk of developing it. He or she will ask you questions about your medical history, including:

- your overall health;
- medications;
- fractures;
- diet; and
- family history.

You may need a physical examination and blood and urine tests to rule out other diseases that weaken bones.

If you are at risk of developing osteoporosis, or already show signs of the disease, your doctor may suggest a bone-density test. This test is the best way to measure bone mass and predict the risk of bone fracture. It is helpful for diagnosis of osteoporosis, especially in the disease's early stages.

Getting an accurate measure of bone density can help you and your doctor evaluate the need for preventive measures and treatment. Bone density tests should be done in people who:

- are taking glucocorticoids;
- have spine fractures; or
- have diseases that affect calcium absorption.

Bone-density tests may be recommended for some women after they have experienced meno-

pause if they are not taking estrogen or if they are at very high risk for osteoporosis. The tests also are used to monitor osteoporosis prevention and treatment.

Bone measurement is a quick, painless and inexpensive test. The most accurate of these tests is done with a tool called a bone densitometer, which uses dual-energy X-ray absorptiometry (DEXA). The DEXA scan can measure as little as 1 percent to 2 percent loss of bone. The DEXA scan also is used to note changes in bone density over time and with treatment.

X-rays of the bones help show fractures. However, X-rays are not accurate in determining bone density because 30 percent or more of the bone must be lost before the X-ray shows it clearly. Special CT scans also can measure bone density.

Your doctor also may do laboratory tests to help rule out other osteoporosis factors. These laboratory tests may include:

- serum calcium and phosphorous level;
- serum protein level;
- thyroid hormone level;
- alkaline phosphatase level;
- liver and kidney function tests;
- complete blood count;
- vitamin D level; or
- urine bone breakdown markers.

Some doctors have special training and experience that helps them diagnose and treat people with osteoporosis. These doctors include:

- Rheumatologists (R00-ma-tall-o-jists) specialize in treating people with arthritis and related diseases.
- Endocrinologists (en-do-krin-ALL-o-jists) specialize in treating diseases of the body's

endocrine system (glands and hormones) that can include osteoporosis.

- Orthopaedic surgeons (or-tho-PEE-dik SIR-jins) treat osteoporosis fractures.

OSTEOPOROSIS TREATMENT

Many of the steps you can take to prevent osteoporosis also can help treat it. You should learn about the risks and benefits of potential treatments. Consider your age, health factors and personal preferences when comparing treatments. Talk about them with your doctor.

Hormone replacement therapy (HRT) is the oldest and most widely prescribed therapy for osteoporosis. It is used to prevent or treat bone loss by making up for the drop in estrogen levels after menopause. HRT, also known as estrogen replacement therapy (ERT), can slow the progression of osteoporosis once it has developed. HRT also can reduce the risk of fractures.

Many doctors recommend HRT for women when menopause occurs. Researchers also have found that HRT can improve bone mass, even in women who have osteoporosis and already have experienced menopause. Prescriptions come in a patch or in pill form. Combination pills containing both estrogen and progesterone are available.

Recent evidence suggests that HRT increases the risk of cardiovascular complications, such as heart attacks and strokes. Women considering HRT for the treatment or prevention of osteoporosis should discuss this with their doctors and weigh the benefits and risks carefully.

Selective estrogen receptor modulators (SERMs) are drugs that work like estrogen, but with fewer side effects. Raloxifene (*Evista*) is the first SERM approved for the treatment and prevention of post-menopausal osteoporosis. Raloxifene can prevent bone loss in the spine,

hip and total body and has been shown to decrease the rate of spine fractures. It also produces small increases in bone mass. Side effects include an increased risk of hot flashes.

Bisphosphonates are compounds that can slow the loss of bone from osteoporosis, restore bone density and improve bone strength. Bisphosphonates are not hormones, so women who cannot take estrogen can use them.

Alendronate (*Fosamax*) and risendronate (*Actonel*) are the first of these drugs to be approved by the FDA for the treatment and prevention of post-menopausal and glucocorticoid-induced osteoporosis. They work by stopping the breakdown of bone. This leads to an increase in bone density and decreases the risk of fractures in the spine, wrist and hip.

Alendronate and risendronate decrease bone loss during glucocorticoid-induced and post-menopausal osteoporosis. Risendronate inhibits bone breakdown by bone cells called osteoclasts. By binding to the bone, risendronate can reverse bone loss and help reduce the risk of fractures. It does this by stopping the progressive loss of bone that occurs because of glucocorticoid therapy or following menopause.

Etidronate (*Didronel*) is another bisphosphonate that has been shown to increase spinal bone density in postmenopausal women with osteoporosis. It has not yet been approved by the Food and Drug Administration (FDA) for use in the U.S. to treat osteoporosis.

The FDA also has approved a naturally occurring hormone called **calcitonin** for people who cannot take standard HRT using estrogen and progesterone. Calcitonin is approved for osteoporosis treatment, not prevention. It is not considered to be as strong as the bisphosphonate medications in preventing fractures. It controls bone breakdown and may relieve pain in people

with spine fractures or compression of the spine. It is available as an injection (*Calcimar*) and a nasal spray (*Miacalcin*).

When fractures occur, treatment may include casts, braces or surgery. Physical therapy, exercise, pain relievers and rest are important for proper recovery from a fracture.

Treatments Under Study

Several treatments for osteoporosis currently are under study. Some treatments are already used in other countries but have not yet been approved by the FDA to treat osteoporosis in the United States.

A treatment called parathyroid hormone (PTH) is a promising drug under investigation for the treatment of post-menopausal osteoporosis. It is given as a daily injection. Parathyroid hormone appears to be the first treatment that increases bone strength and decreases fractures by increasing the formation of new bone.

Several bisphosphonates currently are being considered for FDA approval. Testosterone therapy and estrogen therapy also are being studied as important tools for treating men with osteoporosis.

Sodium fluoride is a bone-forming agent. It promotes new bone growth and may be used to treat established osteoporosis. It may not reduce the risk of fracture. The new bone that is formed may be weaker than regular bone. However, new forms of this drug and other bone-forming agents are being tested.

Additional SERMs, such as tamoxifen and idoxifene, also are being studied.

Levels of vitamin D in the body decrease with age. Researchers are studying the vitamin metabolites to learn if increasing vitamin D levels has an effect on bone loss or bone mass in osteoporosis patients.

New methods are continually being developed to detect and treat osteoporosis. Your doctor is the best guide to finding the right treatment and helping you understand its risks and benefits.

PREVENTING FALLS

As you get older, you may experience some changes that increase your chances of falling and breaking a bone. These changes include:

- weakness from muscle loss;
- poor eyesight; or
- dizziness caused by illness or medications.

Even a minor fall can break a bone that is already weak from osteoporosis. Consider wearing hip protectors, which are light cloth underclothing with special padding over the hips. Hip protectors can reduce the chance of having a fracture if you fall. These usually are recommended for people with osteoporosis who are at high risk of falling because of strength, vision or balance problems.

Regular exercise and wearing low-heeled shoes with non-slip soles can reduce your risk of falling. Be sure to get regular eye exams and wear glasses or contacts if you need them. These can improve your eyesight. Ask your doctor if you are taking any medications that might cause dizziness.

The tips below are ways to make your home safer. This will decrease your chances of falling.

LIGHTS

- Keep hallways, stairs and rooms well lit.
- Install nightlights where needed.
- Keep a flashlight beside your bed. Use it if you get up during the night.

STAIRS

- Install light switches at the top and bottom of stairways.
- Cover stairs with a nonslip surface.
- Install and use sturdy handrails.

BATHROOM

- Install handrails beside the bathtub and toilet and in the shower.
- Use a rubber mat or rubberized decals in the bathtub to prevent slipping.
- Install a grab bar in the shower.

RESEARCH

The Arthritis Foundation is currently funding 17 studies focused on osteoporosis, representing a total commitment of \$3.7 million.

AF-funded research is improving lives of people with osteoporosis and those at risk by:

- Identifying risk factors so that those at high risk can be identified and helped to reduce their risk;
- Increasing our understanding of bone biology and basic mechanisms responsible for osteoporosis, laying the basis for new, improved therapies; and
- Developing strategies for helping people with osteoporosis and those at risk to learn how to prevent osteoporosis and fractures.

FOR MORE INFORMATION

Osteoporosis and You! – This six-hour Arthritis Foundation program is designed for people with arthritis who are at risk for developing osteoporosis or who have symptoms of osteoporosis. Contact your local Arthritis Foundation chapter to find out if the program is offered in your area.

You also may contact the following organization for more information about osteoporosis:

National Osteoporosis Foundation
1232 22nd Street N.W.
Washington, D.C. 20037
202/223-2226
www.nof.org

THE ARTHRITIS FOUNDATION

The mission of the Arthritis Foundation is to improve lives through leadership in the prevention, control and cure of arthritis and related diseases.

The Arthritis Foundation supports research with the greatest potential for advances and has invested more than \$320 million in these efforts since its inception in 1948. Additionally, the Arthritis Foundation supports key public policy and advocacy efforts at a local and national level in order to make a difference on behalf of 70 million people living with arthritis.

As your partner in taking greater control of arthritis, the Arthritis Foundation also offers a large number of programs and services nationwide to make life with arthritis easier and less painful and to help you become an active partner in your own health care.

Contact us at (800) 283-7800 or visit us on the Web at www.arthritis.org to become an Arthritis Advocate or to find out how you can become involved.

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For more information: The Arthritis Foundation offers a wide variety of books, brochures and videos about different forms of arthritis, treatment and self-management techniques to help you take control of your arthritis. To order any of these products, become an Arthritis Foundation member or to subscribe to the Arthritis Foundation's award-winning consumer health magazine, *Arthritis Today*, call (800) 283-7800. Call or visit our Web site (www.arthritis.org) to find out how you can take control of your arthritis and start living better today!

MISSION STATEMENT:

The mission of the Arthritis Foundation is to improve lives through leadership in the prevention, control and cure of arthritis and related diseases.

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