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## Osteoporosis

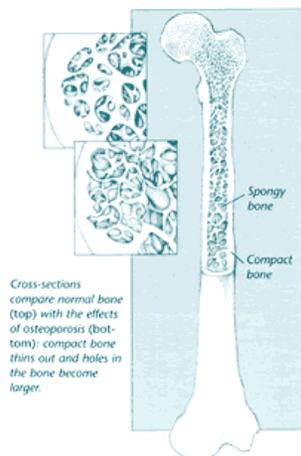
Bones go through a constant state of loss and regrowth. As a person ages, more loss than growth can occur. This can lead to a condition called osteoporosis. The bones then become thin and fragile and can break easily. This pamphlet will explain:

- Risk factors of osteoporosis
- How it can be detected
- How you can help prevent it

### What Is Osteoporosis?

Bone is made up of calcium and protein. There are two types of bone--compact bone and spongy bone. Each bone in the body contains some of each type. Compact bone looks solid and hard and is found on the outer part of bones. Spongy bone is filled with holes, just like a sponge, and is found on the inside of bones. The first signs of osteoporosis are seen in bones that have a lot of spongy bone, such as the spine, hip, and wrist.

Once made, bone is always changing. Old bone is removed in a process called resorption, and new bone is formed in a process called formation. From childhood until age 30 years, bone is formed faster than it is broken down. The bones become large and more dense. After age 30 years, the process begins to reverse: bone is broken down faster than it is made. This process continues for the rest of your life. A small amount of bone loss after age 35 years is normal in all women and men. Most of the time, it does not cause any problems. However, too much bone loss can result in osteoporosis.



With osteoporosis, bones become thin and brittle because more bone is lost than formed. The bones are still the same size, but the outside walls of compact bone become thinner, and the holes in spongy bone become larger. These changes greatly weaken the bone.

Osteoporosis can pose a special threat to women. Estrogen --a female hormone --protects against bone loss. As a woman nears menopause, her body produces less estrogen. However, bone loss begins to happen long before menopause. Often, by the

time symptoms of osteoporosis show, a great deal of bone loss has already occurred.

Some symptoms of osteoporosis are back pain or tenderness. Signs include a loss of height, and a slight curving of the upper back. As the spinal bones weaken, they slowly collapse under the weight of the upper body. This causes a curving of the spine--often called a "dowager's hump."

Osteoporosis affects at least 10 million Americans--most of whom are women. Each year, more than 1.5 million fractures related to osteoporosis occur in the United States. One in two women older than 50 years will have a fracture related to osteoporosis in their lifetime. Fractures can be crippling and painful and cause lifelong disability. As many as 24% of patients older than 50 years with a hip fracture die in the year following their fracture from problems caused by lack of activity,

such as blood clots and pneumonia.

## Risk Factors

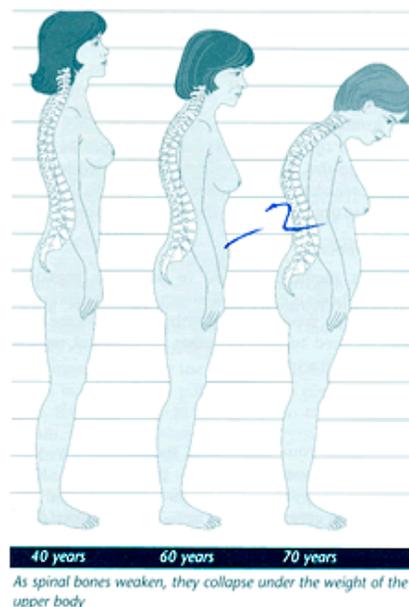
Compared with men, women are more at risk of osteoporosis because their bones are smaller and lighter than men's. The following factors can increase that risk:

- Menopause--Bone loss increases after menopause because the ovaries stop making estrogen, which protects against bone loss.
- Removal of ovaries--If a woman has her ovaries removed before menopause, the sudden decrease in estrogen can result in rapid bone loss unless she takes a preventive treatment, such as estrogen.
- Personal or family history of fracture
- Diet low in calcium (lifelong)
- Recent falls
- Lack of exercise
- Low body weight (less than 127 pounds)
- Poor health
- Dementia
- Some medications (see box)
- Alcohol and tobacco use
- Certain medical conditions
- Use of certain corticosteroids
- Vision problems

## Medications and Osteoporosis

Women who take certain medications may be at increased risk for osteoporosis. These medications may include:

- Anticonvulsants
- Aluminum
- Drugs that suppress the immune system
- Excessive thyroid hormone
- Drugs that affect the adrenal gland and the **pituitary gland**
- **Gonadotropin-releasing hormone (GnRH) agonists**
- Blood thinner
- Lithium
- Anti-cancer drugs



## Prevention

It is hard to grow new bone after it is lost, so prevention is important. Slowing bone loss helps build strong bones. To prevent osteoporosis, focus on building and keeping as much bone as you can. This can be done by exercising and eating enough calcium and Vitamin D during your reproductive years, especially during pregnancy and while breastfeeding. After menopause, your doctor may suggest therapy to protect against bone loss.

## Exercise

Exercise increases bone mass before menopause and slows bone loss after menopause. Just as muscles become stronger with regular exercise, so do bones. Bones are strengthened by having the muscles pull on them. Bone loss will occur any time the bones are not used. For example, it becomes worse in people who are bedridden for a long time. Active women have higher bone density than women who do not exercise.

Most aerobic exercise is good for the heart and bones. To help prevent bone loss, the exercise

should be weight-bearing, such as low-impact or step aerobics, brisk walking, and tennis. Even walking several blocks each day will slow bone loss. It is never too late to start exercising, and even a little bit of exercise is better than none at all. If you have questions about the best exercise program for you, it may be wise to talk with your doctor or a professional who knows about health and exercise. Let him or her know if you have a physical problem that may limit your exercise.

### **Diet**

Bone loss can increase if your diet is low in calcium. Calcium slows the rate of bone loss. If the amount of calcium in the bloodstream is too low, it will be taken from the bones to supply the rest of the body.

**Table 1. Foods Containing Calcium**

<b>Food</b>	<b>Amount</b>	<b>Calcium (mg)</b>	<b>Fat (g)</b>
<b><i>Milk and dairy products</i></b>			
American cheese	1 oz	195	8.4
Cheddar cheese	1 oz	211	9.1
Swiss cheese	1 oz	219	7.1
Ice cream--hard	1 cup	176	14.1
Low-fat milk	1 cup	298	4.7
Skim milk	1 cup	303	0.4
Low-fat plain yogurt	1 cup	415	3.4
<b><i>Nuts</i></b>			
Almonds	1 oz	66	16.2
Sesame seeds	3 1/2 oz	100	53.4
<b><i>Seafood</i></b>			
Scallops, steamed	3 1/2 oz	115	1.4
Shrimp, raw	3 1/2 oz	63	0.8
<b><i>Green leafy vegetables</i></b>			
Broccoli, cooked	2/3 cup	88	0.3
Kale, cooked	3/4 cup	187	0.7
Spinach, cooked	1/2 cup	83	0.3
Turnip greens, cooked	2/3 cup	184	0.2
<b><i>Other foods</i></b>			
Chili con carne	5 oz	61	9.9
Cream of celery soup	1 serving	135	33.0
Figs, dried	5 medium	126	1.3
Pudding, chocolate	1/2 cup	147	6.6
Raisins, dried, seedless	5/8 cup	62	0.2

Good sources of calcium are dairy products, such as milk and yogurt. Other sources are leafy green vegetables, nuts, seafood, and juices and cereals that are fortified with calcium (see Table 1). A well-balanced diet is very healthy for bones.

Most women need more calcium in their diets. In fact, many women get only one half of the daily amount of calcium they need. It is hard to get enough calcium by diet alone without eating foods that are high in fat and calories. Thus, you may need to take calcium supplements. Ask your pharmacist to suggest a calcium supplement. Women older than 50 years who take hormone therapy (HT) need 1,000 mg of calcium per day and women who do not take HT, need 1,500 mg of calcium per day. Be aware, however, that your body can only absorb up to 750 mg of calcium at one time. If you take more than 750 mg per day, divide it into two doses.

Calcium cannot be absorbed without vitamin D. Milk that is fortified with vitamin D is one of the best sources. Another is sunlight. Being in the sun for just 15 minutes a day helps your skin produce vitamin D and activates vitamin D in your body. You also can use vitamin D supplements. A woman should take the recommended daily amount of vitamin D, which is 400-800 IU (international units).

## Detection

You should have a physical exam once a year. During this exam, you can be given special tests that show the density of bone. Once you know you have osteoporosis, these tests also can help your doctor check your rate of bone loss. Routine X-rays only show when much bone already has been lost.

All women aged 65 years and older or who have had a bone fracture should be tested for bone mineral density. Testing also may be suggested for postmenopausal women younger than 65 years who have one or more risk factors for osteoporosis.

Bone mineral density tests measure bone mass in the heel, spine, hip, hand, or wrist. Measuring one area can give your doctor a sense of your bone density in other parts of your skeleton. The devices used for the tests vary, but all involve X-rays or beams from other energy sources. You may be asked to lie on your side or back for the X-ray, or you may sit and place your hand or foot into a cylinder. The tests can take as little as 1 minute or as much as 40 minutes. A bone density test can help detect problems before a fracture occurs. A test also can help determine:

- Whether you have osteoporosis
- Your rate of bone loss
- Your risk of a future fracture

There are several ways to measure bone density. They are all painless and safe.

### **Dual-Energy X-ray Absorptiometry**

Dual-energy X-ray absorptiometry (DXA) is used most often to measure the bone density of your spine or hip. It is currently the most accurate test available.

During the test, you lie down for 3-10 minutes while an armlike device called an imager scans your body. With this test you are exposed to a very small amount of radiation--less than the amount in a normal chest X-ray.

### **Quantitative Computed Tomography**

Quantitative computed tomography (QCT) uses both computed tomography scanning and computer software to test the bone density of the spine. This test provides three-dimensional images and requires only a little more radiation than a DXA test.

## Avoiding Falls

Women with osteoporosis should try to reduce their risks of injuries from falls. They should:

- Learn good posture.
- Avoid twisting, bending, and lifting.
- Make their homes safe by using nonskid backing on throw rugs, making sure rooms are well lit, and using handrails by stairs and in the bathroom.
- Check and correct (if needed) vision and hearing problems
- Review medications for side effects that may affect balance and stability

### How Much Calcium Do You Need?

Age	Optimal Daily Intake (in mg)
Children ages 1-10	800
Teenagers	1,200-1,500
Ages 25-50	
• Before menopause	1,000
• Surgical or premature natural menopause	1,500
Over 50	
• Not taking estrogen	1,500
• Taking estrogen	1,000
Pregnant or nursing	Additional 400

Source: The National Institutes of Health's Developmental Conference on Optimal Calcium Intake.

For a QCT test, you lie down on a table that slides into a large tubelike structure where the images are taken. Most of the time this test takes less than 10 minutes.

### ***Quantitative Ultrasonography***

This test, which often takes less than 1 minute, uses sound waves instead of radiation to measure bone density. During this test, you place your bare foot on the machine and sound waves are transmitted through your heel.

Quantitative ultrasonography is a peripheral device. Peripheral devices often are found in drugstores and pharmacies. These devices are small, portable machines that measure density in places such as your heel or even your finger. Although tests on these locations may help predict the risk of fracture in your spine or hip, it often is not as accurate as the DXA and QCT tests. This is because bone mass is not the same in all areas of the body.

### **Treatment**

There are many treatment options available to help reduce the risk of fracture. The earlier treatment is started, the better it works.

### ***Hormone Therapy***

Hormone therapy slows bone loss after menopause. Estrogen has been shown to decrease the risk of hip fractures and spinal deformities. Estrogen also can relieve symptoms that occur around menopause, such as hot flashes (hot flashes).

In women who have a uterus, estrogen is given along with another hormone-- progestin . This decreases the risk of endometrial cancer, which occurs when estrogen is given alone.

Hormone therapy for osteoporosis is most often given in the form of pills or a patch placed on the skin. Estrogen used in the vagina in the form of a cream, a ring, or tablets can treat dryness, but these forms do not prevent osteoporosis.

Starting estrogen at any time after menopause can help prevent bone loss. However, it only protects bones for as long as you use it. When you stop taking hormone therapy, bone loss resumes. It is not recommended that you take HT just to prevent bone loss because the risks may outweigh the benefits. Although, if you are taking HT to relieve other symptoms of menopause, you'll get the benefit of protecting your bones for as long as you take it. For a woman to continue to benefit, she must continue therapy. You and your doctor should decide whether this treatment is right for you.

### ***Selective Estrogen Receptor Modulators***

Women also can take a type of drug known as selective estrogen receptor modulators (SERMs) to help prevent some of the bone problems that can occur during menopause. Raloxifene is a type of SERM that helps strengthen the tissues of the bones.

SERMs may be a good choice for women who need protection from osteoporosis, but can't or don't want to take HT. This may include:

- Women at risk of breast cancer
- Women who can't tolerate the side effects of HT
- Women who don't need relief from symptoms of menopause
- SERMs do not relieve hot flashes. They may even make them worse.

### ***Bisphosphonates***

If a woman does not take estrogen or SERMs, there is another option for preventing

osteoporosis-- bisphosphonates . These medications are used to slow bone breakdown. They also are used to increase bone density and reduce the risk of fractures.

### ***Other Options***

Another medication used to slow the breaking down of bone is called calcitonin. It can be given by injection or nasal spray. Parathyroid hormone also may be used to increase bone density and reduce the risk of fractures.

### **Finally...**

To increase your chances of staying healthy, you have an important goal--to prevent bone loss. Exercise every day, even if you walk only a few blocks, and get enough calcium. Talk with your doctor about methods to prevent, diagnose, and treat osteoporosis.