

How You Can *Exercise* for Bone Health

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What is Osteoporosis?

Here's something that sounds like a science fiction nightmare.

Consider an insidious condition that drains away bone — the hardest, most durable substance in the body. It happens slowly, over years, so that often neither doctor nor patient is aware of weakening bones until one snaps unexpectedly. It's why osteoporosis is called the *silent thief*.

And it steals more than bone. It's the primary cause of hip fracture, which can lead to permanent disability, loss of independence, and sometimes even death. Collapsing spinal vertebrae can produce stooped posture and a "dowager's hump." Lives collapse too. The chronic pain and anxiety that accompany a frail frame make people curtail meaningful activities because, in extreme cases, the simplest things can cause broken bones: Stepping off a curb. A sneeze. Bending to pick up something. A hug. "Don't touch Mom, she might break" is the sad joke in many families.

Osteoporosis leads to 1.5 million fractures, or breaks, per year, mostly in the hip, spine and wrist. It threatens 34 million Americans, mostly older women, but older men get it too. One in 2 women and 1 in 4 men older than 50 will suffer a vertebral fracture.

Osteoporosis, which means "porous bones," is a condition of excessive skeletal fragility resulting in bones that break easily. A combination of genetic, dietary, hormonal, age-related, and lifestyle factors all contribute to this condition. The osteoporosis seen in postmenopausal women is the most common and best studied, but there are other causes that may be treated differently.

There is no cure or proven preventive treatment for osteoporosis, but the onset can be delayed and the severity diminished. Most important, early intervention can prevent devastating fractures.

Bone Life

Bone consists of a matrix of fibers of the tough protein collagen, hardened with calcium, phosphorus and other minerals. Two types of architecture give bones strength. Surrounding every bone is a tough, dense rind of cortical bone. Inside is spongy-looking trabecular bone. Its interconnecting structure provides much of the strength of healthy bone, but it is especially vulnerable to osteoporosis.

Every bit as dynamic as other tissues, bone responds to the pull of muscles and gravity, repairs itself, and constantly renews itself.

Besides protecting internal organs and allowing us to move about, bone is also involved in the body's handling of minerals. Of the 2 to 4 pounds of calcium in the body, nearly 99 percent is in the teeth and skeleton. The remainder plays a critical role in blood clotting, nerve transmission, muscle contraction (including heartbeat), and other functions. The body keeps the blood level of calcium within a narrow range. When needed, bones release calcium.

A complex interplay of many hormones balances the activity of the two types of cells — osteoclasts and osteoblasts — responsible for the continuous turnover process called remodeling. Osteoclasts break down bone, and osteoblasts build it. In youth, bone building prevails. Bone mass peaks by

about age 30, then bone breakdown outpaces formation, and density declines, since the volume of bone remains about the same.

The skeleton is like a retirement account for minerals, but in our skeletal "account" we can deposit bone faster than we withdraw it only during our first three decades. After that, withdrawals are greater than deposits, and all we can do is try to minimize the net loss. Osteoporotic fractures are the sign of the bankruptcy that occurs when too little bone is formed during youth, or too much is lost later, or both.

You've got to get as much bone as you can and not lose it. The most important risk factor for osteoporosis is a low bone mass.

The upper limit of bone mass that you can acquire is genetically determined. But even though you may be programmed for high bone mass, other factors can influence how much bone you end up with. For instance, men tend to build greater bone mass, which is partly why more women face osteoporosis.

But there's another reason. With the decline of the female hormone estrogen at menopause, usually around age 50, bone breakdown markedly increases. For several years, women lose bone two to four times faster than they did before menopause. The rate usually slows down again, but some women may continue to lose bone rapidly. By age 65, some women have lost half their skeletal mass.

Your Treatment Options

Calcium and vitamin D supplements are an integral part of all treatments for osteoporosis. At the same time, people who take supplements should keep in mind that it is possible to consume excess amounts of these and other nutrients. Paying attention to diet and exercise is important not only for treatment, but also for prevention.

If you go to the doctor and get a prescription, and that's all you do, you're probably not going to be helped very much.

Calcium intake is critical, and those who need it most — younger women and girls — may not get enough. Vitamin D is needed to help the body absorb calcium. Most people appear to get enough vitamin D because the skin produces it in sunlight. And many foods, such as milk products and breakfast cereals, are fortified with vitamin D. But older adults and people with little exposure to sunlight may need a vitamin D supplement.

Exercise is Vital

Exercise is an important component in the treatment of osteoporosis. It can decrease bone loss, increase bone density, and reduce the risk of fractures. It's important to understand the principles of proper exercise for preventing and treating osteoporosis to ensure that a program is both safe and effective.

Exercises to Increase Bone Density

Both weight-bearing and resistance exercises have been shown to increase bone density.

Weight-bearing exercises refer to activities where the weight of the body is transmitted through the bones, working against gravity. Your bones respond to this force by growing stronger. Walking, jogging, dancing, hiking, stair climbing, and aerobic exercises are all examples of weight-bearing exercises. Bike riding and swimming, although good exercises, are not weight-bearing. Weight-bearing exercises should be performed at least three to five times per week. The goal is to work up to 45 minutes or more per session. If you have osteoporosis, you should not perform high impact activities such as jogging or high-impact aerobics. These exercises cause too much jarring of the spine and can increase the risk of vertebral fractures.

Resistance exercises generate muscle tension on the bones. This strengthens the muscles and stimulates the bones to grow stronger. Exercising with weights or resistance bands are examples of this type of exercise. If you have osteoporosis, make sure to review your strength training program in advance with your physician or physical therapist. Resistance exercises should be performed two to three times a week.

Other Exercises

Postural exercises decrease harmful stress on the back. By performing these exercises, you can reduce your risk of spinal fractures and the rounded shoulders commonly seen with osteoporosis. These exercises should be performed throughout the day to reinforce good posture. Postural exercises help maintain proper body alignment and decrease harmful stress on the back. Stretching the muscles of the chest and strengthening the back muscles help promote good posture. One example is a shoulder stretch. In this exercise, you pull your shoulder blades together while visualizing your spine stretching up and lengthening.

Balance exercises help maintain equilibrium and can reduce the risk of falling. These exercises should be performed daily.

Exercises You Should Avoid

Individuals with osteoporosis and osteopenia should avoid any exercises that increase forward bending or rounding of the spine. These exercises include sit-ups, toe touches, and the use of exercise equipment that applies **flexion forces** (some abdominal machines). Forward-bending exercises have been found to increase the incidence of spinal fractures in women who have osteoporosis.

Excessive twisting places large compressive forces on the spine. Individuals with osteoporosis and osteopenia should avoid exercises such as windmill toe touches, since there is added stress to the spine when forward bending is combined with rotation.

Important Principles of Exercise

Individuals with osteoporosis or osteopenia should keep in mind a few exercise principles that can promote health and prevent injury.

Perform extension (backward-bending) exercises: Strengthening the back muscles can help counteract the rounded posture often seen in osteoporosis and can reduce the incidence of spinal fractures. Women with stronger back muscles were shown to have a significant increase in spinal bone-mineral density. Many exercise programs fail to include spinal extension or backward-bending exercises, which should be an integral part of any osteoporosis program.

Target areas most prone to fractures: Exercise has been shown to be site-specific. Exercising the right elbow does not have any effect on the left hip. For osteoporosis treatment and prevention, it is important that an exercise program target the areas most affected by the disease, which would be the spine, hips, and wrists.

Exercise needs to be continued to maintain benefits: Bone-mineral density gains from exercise are only maintained as long as the exercise is continued at the same level of intensity.

Resistance levels should be increased: Bone responds to the mechanical forces placed upon it. By providing weight through the bone that is greater than the normal forces the body is accustomed to, bone density increases. Weight-bearing and resistance exercises can produce this stimulus if there is sufficient weight. It is important to gradually increase the levels of resistance in order to continue to increase bone density.

Bone density increases with low-repetition, high-weight programs: Studies have shown that post-menopausal bone density can be significantly increased by a low-repetition, high-weight program, but not by a high-repetition, low-weight program. Individuals with osteoporosis and those at risk should perform at least one set of eight to ten repetitions of an exercise. Optimally, they should strive to achieve three sets of an exercise with a one- to two-minute rest interval between sets. Once ten repetitions can be performed easily, the weight should be gradually increased in order to continue to build bone density. It is important to speak with your physician before beginning an exercise program.

Increase the weights slowly: Before you begin exercising with weights, it is important to perform the exercise without weights to make sure you can do it using proper mechanics and without pain. I recommend one-pound weights and gradually increase the weight, as tolerated. Again, speak with your physician concerning any weight limitations you may have. Dr. Mehrsheed Sinaki, from the Mayo Clinic, recommends that individuals with osteoporosis not exceed five pounds in each hand during upper-extremity weight lifting. This is a safe, conservative approach. In my experience, however, heavier weights may be used under the guidance of a physical therapist. It is important to reinforce the critical role of proper posture and body mechanics when performing these exercises.

Components of a Walking Program

Walking is an excellent weight-bearing exercise.

Here are some tips:

- Warm up by walking at a slow-to-normal pace for five minutes.
- Increase speed gradually until walking briskly.
- Always make sure comfortable talking is possible while walking.
- Try to keep walking at a level that can be maintained for at least 20 minutes.
- Work up to a 45-minute walk.
- Cool down with a five-minute slow walk.
- Perform gentle stretches before and after walking.

Studies have shown that women who walked briskly achieved gains in bone density. It is most beneficial to walk at your target heart rate.

Daily Living Activities

While exercising, we focus on posture and strength. But what about the rest of the day? Do we bend or lift properly? We can improve body function and reduce the risk of injury from osteoporosis by the proper performance of activities of daily living. By using good posture and body mechanics, excessive forces on the spine can be significantly reduced.

Guidelines for proper performance of daily life activities include:

Sitting without slouching: It is important to avoid sitting in a slumped position that rounds out the lower back. This posture puts forceful pressure on the lower back, upper back and neck regions, and can lead to injury. A towel roll, lumbar roll or back support can help maintain a good sitting posture. This support should be placed in the small of your lower back to help maintain its natural curve. It is helpful to get up frequently from sitting—at least once an hour.

Bending from the hips: It is important to bend from the hips and knees and not the waist. The hips are located deep in the folds where your legs join your trunk. It is helpful to visualize your body as being divided into an upper and lower half, with the hips as the dividing line. Your movement should take place at the hips. This maneuver avoids forward bending of the back, which increases the incidence of spinal fractures.

Stabilizing the back while coughing or sneezing: The sudden force of a cough or sneeze can cause your spine to bend forward suddenly. This natural event can lead to injuries of the spine and vertebral fractures. One method of protecting your back is to place one hand in the small of the low back during the cough or sneeze.

Custom-Designed Exercise Programs

A physical therapist can design an exercise program that is safe and appropriate for both prevention and treatment of osteoporosis. Physical therapists are trained to teach proper ways to perform daily activities that can help prevent fractures. Many individuals with osteoporosis will have postural changes, muscle, and soft tissue tightness that requires the hands-on treatment of a physical therapist.

At Santa Maria Valley Physical Therapy Group, an outpatient orthopedic clinic that has served Santa Maria for 19 years, we have trained therapists who specialize in the problems of osteoporosis. We'll work to develop a personalized exercise program with one-on-one instruction for you.

By learning the basic principles of safe, effective exercises to prevent and treat osteoporosis, you can begin your lifelong journey to good health. Not only will it help reduce your risk or degree of osteoporosis, but it will improve your overall fitness and quality of life. If you have questions or need further guidance, contact us.

Note: This report was created in part from materials provided by the Food and Drug Administration and Healthology.com.