

Osteoporosis and “What If?”

By J.E.B. Stuart, V, M.D.

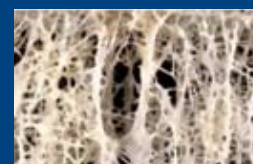


Figure 1.

Normal Bone



Osteoporotic Bone



process, whether by inadequate production, excessive removal, or both. The result is too little bone, though what is there is qualitatively normal. The bone-forming cells predominate until the age of 25, when things begin to even out. As we get older, the bone-removing cells can predominate, leading to a weakening of the bone. Osteopenia is a term used to describe mild thinning of the bone or low bone mass, which typically occurs before osteoporosis. Osteoporosis and osteopenia are considered “silent diseases”, because the bone loss occurs without any symptoms. The primary goals of treatment are to (1) bolster or improve the health of the bone-forming cells, and (2) decrease the activity of the bone-removing cells.

How common is osteoporosis?

Osteoporosis is a major health problem, affecting approximately 28 million Americans and contributing to an estimated 1.5 million bone fractures per year. Osteoporosis is most common in older women, affecting 25% of women over the age of 60. One in two women and one in five men over age 65 will sustain bone fractures due to osteoporosis. The wrist, hip, and spine are the most common areas for osteoporosis-related fractures. (Figure 2) Because the condition is typically painless, most people are not aware that they have osteoporosis until they sustain one of these fractures.

“What if?” We ask ourselves that question in two ways. The first way is a reactive question to an adverse event. “What if I had done things differently?” There might have been a better outcome. The typical adverse outcome seen by an orthopaedic surgeon is a fracture that has occurred after a minor injury or a spine fracture found after a simple fall. The event has already occurred, and there is nothing that can be done to change the outcome. The second way of asking ourselves “What if?” is a proactive or preventive way of improving an outcome. “What if I take care of my bones now?” Fortunately, preventing

osteoporosis is achievable in most situations. It requires simple changes in lifestyle, dietary supplementation, and occasionally medication.

What is osteoporosis?

Osteoporosis is a bone disease causing thinning and weakening of the bone due to loss of minerals. (Figure 1) Bone is a living tissue and is constantly turning over. Bone is a metabolically active organ system, constantly tearing down old bone and replacing it with new. Osteoporosis is an imbalance in this

The most serious and debilitating osteoporotic fracture is the hip fracture. Over 300,000 hip fractures occur each year. Most hip fracture patients who previously lived independently will require help from their family or from home care. All hip fracture patients will require walking aids for several months, and nearly half will permanently need canes or walkers to move around inside their house or outdoors. Hip fractures are expensive. Health care costs from hip fractures alone total more than \$10 billion annually - \$35,000 per patient.

What causes osteoporosis?

Women are affected by osteoporosis more than men, due to the decreased estrogen levels that occur after menopause, usually after the age of 50. Men are affected as they age, and by 75 nearly a third of men develop the disease. There are several other risk factors known to increase the rates of osteoporosis. (Table 1)

What can I do to prevent osteoporosis?

Fortunately, osteoporosis is a condition that can be prevented by making simple changes to your lifestyle and dietary intake. Prevention begins in your teenage years when the body is storing up minerals. Adequate calcium and vitamin D in your diet is crucial to maintaining and improving bone health. Exercising is one of the more important things you can do to improve bone health. Avoiding or quitting cigarette smoking can go a long way toward preventing these changes. Limit your use of alcohol. You also have the added benefit of decreasing your risk of developing heart and lung disease. Regular physical examinations with appropriate blood and diagnostic tests

are important components of prevention as well.

Bones require force or weight bearing to maintain and increase strength. Astronauts actually develop a temporary form of osteopenia while in space because of the weightless environment. Daily weight-bearing exercise for a minimum of 45 minutes is ideal. Jogging, walking, or any activity involving running around is the best. Walking with hand weights improves muscle tone in the arms, which in turn strengthens the bones in the arms. Although swimming is excellent for aerobic exercise, it does not benefit your bones because it is non-weight-bearing. A physical therapy evaluation emphasizing balance, posture, and exercise training may be of benefit in tailoring a specific exercise program for you.

A proper diet is an important aspect of maintaining and improving bone health. A balanced diet of nutritious foods helps keep you at an appropriate weight. Calcium and vitamin D are required for bone metabolism, and supplementing your diet with these becomes more important as you age. Children and young adults can get a head start on “banking” calcium stores because the body increases bone mass into your 20s and 30s. The National Osteoporosis Foundation recommends calcium intake of 1000 mg per day for men and women under the age of 50 and 1,200 mg per day over the age of 50. Requirements are slightly higher for women than for men. Healthy premenopausal women need 1,200 mg of calcium daily. The requirement increases to 1,500 mg per day after menopause. A typical American woman consumes about 600 mg of calcium daily. Approximately 75 to 80 percent of calcium consumed in the American diet is derived from dairy products (milk, yogurt, cheese, and fortified foods or juices). Calcium citrate is the preferred supplement (as opposed to calcium carbonate).

Vitamin D is critical in promoting the absorption of calcium in our digestive system. Deficiency of vitamin D (which can be measured with a blood test) is very common in the elderly and has been shown to increase the risk of falls. Insufficient vitamin D is also associ-

ated with a number of other conditions such as diabetes, high blood pressure, and heart disease. Vitamin D is obtained from three sources – sunlight (ultraviolet light), diet, and supplements. Sunlight converts chemicals in our skin to a form of vitamin D, so 15 minutes of sun exposure each day is good. If you use vitamin D fortified milk and get outside regularly, you probably get enough vitamin D. The current recommendations from the Institute of Medicine are 200 IU (international units) daily from birth to age 50, 400 IU daily for ages 51-70, and 600 IU daily for those older than 71. Most experts agree that even these levels are too low and recommend 800 to 1000 IU daily. Vitamin D supplementation should be taken only with your physician’s approval. Too much can lead to kidney stones and other conditions caused by too much calcium in your blood. Vitamin D deficiency is a completely preventable and reversible condition.

Several recent studies have proven the effectiveness of supplemental calcium and vitamin D in reducing the risk of hip fractures. Your physician can order tests to measure both calcium and vitamin D levels. Similar to taking aspirin for your heart health, supplemental calcium and vitamin D is important for your bone health.

How is Osteoporosis Diagnosed?

Your doctor may prescribe a special test called a bone density test to see if you have osteoporosis. The most common type of test is a DEXA (dual energy x-ray absorptiometry) scan. This is similar to an x-ray, but it specifically measures the mineral density in certain areas of the body such as the spine, hip, or wrist. The higher the bone density, the less risk there is of fracture. Your bone density is measured as a “T” score, which compares your bone density to that of a young healthy adult. The World Health Organization (WHO) defines osteoporosis as 2.5 standard deviations below normal. Your bone density is also measured as a “Z” score which compares you to people of similar age, gender, and ethnicity. Your measurement is used to assess the increased risk of fractures. The tests are usually repeated every two to three years to measure the effectiveness of treatment. With

Table 1 – Risk Factors

Family history of osteoporosis • Caucasian or Asian ethnicity • Low dietary intake of calcium or Vitamin D • Small body frame or adult weight of less than 127 lbs • Excessive alcohol consumption • High caffeine intake • Smoking • Chronic, high dose steroids such as prednisone • Hormonal disorders • Chronic liver or gastrointestinal diseases

Figure 2.



new medications, you can actually see your bone density increase as you age.

What can be done if I am diagnosed with osteoporosis?

As discussed previously, there are several simple things that can be done. Proper diet, vitamin D and calcium supplementation, lifestyle modification, and exercise are all important yet simple ways of addressing bone health.

If your physician determines that you do have either osteopenia or osteoporosis, you may be considered for specific prescription medication. The medications fall into one of two categories—those that slow the breakdown of bone are called antiresorptive agents. The group of medications that help with forming new bone are called anabolic agents. Some of these medications can increase bone density by 5 or 10 percent.

Drugs that inhibit the cells breaking down the bone (antiresorptive) are most commonly used. They include hormones and a special class of drugs called bisphosphonates. Likely, you have seen commercials for several of these drugs (Fosamax TM, Actonel TM, and Boniva TM). They may be taken on a daily or

yearly basis, depending on which medication is used. They are either taken orally or by injection.

Specific hormones, sometimes called “designer estrogens,” are used also to slow down bone resorption. These selective estrogen receptor modulators (SERMS) are used to prevent and treat osteoporosis in post-menopausal women. These synthetic drugs have fewer side effects than standard estrogen replacement. They are somewhat less effective than bisphosphonates in preventing fractures. The first approved drug in this class is Evista TM. Blood clots in the legs are a potential side effect, so women with a previous history of blood clots should not take this drug.


Another hormone used to decrease bone resorption is Calcitonin (Miacalcin TM). This is given as a nasal spray daily. Though not as effective as the bisphosphonates or SERMS in reducing bone loss, calcitonin may be indicated in patients who do not tolerate the other agents. Regular blood work is required while on this medication to monitor calcium levels.

The only bone-forming (anabolic) agent approved for use in the treatment of osteoporosis is parathyroid hormone (Forteo TM), which is given by a daily self-injection into the thigh or abdomen. Recently approved by the FDA, therapy is limited for a two-year period since there are ongoing studies. This drug is typically reserved for patients with severe osteoporosis and fractures.

Any of these medications should be prescribed only after an evaluation by a physician. They all have potentially serious side effects. Your physician will be able to make the appropriate recommendation based on your health status and can supervise your care. Your orthopaedic surgeon will typically refer you to a specialist if you are a candidate for treatment. Periodic monitoring is needed while on these medications not only to measure the effectiveness but also to avoid potentially serious side effects.

Asking yourself “What if?”

Now that you know what osteoporosis is, you can ask yourself the question: “What if I do something now to prevent or treat osteoporosis?”



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sis?” The answer is, you will be less likely to have a fracture, which can result in chronic pain and disability. This is good news, because osteoporosis is one of those diseases which can be treated effectively and reversed. Whether you are young or old, it is never too late to start taking care of your bone health.



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