

Chapter 1

Boning Up on Osteoporosis

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 - ▶ Getting an early diagnosis
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Years ago, when your authors first started taking care of patients, doctors had no way to diagnosis early osteoporosis. By the time osteoporosis was apparent on a regular X-ray or a fracture had occurred, significant bone loss had already affected the individual. Nor did doctors have any effective drugs to treat or prevent osteoporosis. We've come a long way, baby, in the early detection, prevention, and treatment of osteoporosis.

In this chapter, we introduce you to the problems of osteoporosis and explain why it's an issue affecting everyone. Even if you're not at risk for developing osteoporosis, you undoubtedly have a younger loved one who is in the process of building bone. We want to help you understand what you can do to make your bones, and those of your loved ones, the best they can be, even if you've never had a glass of milk in your adult life.

Defining Osteoporosis

What exactly is osteoporosis? The standard World Health organization (WHO) definition is that *osteoporosis* is “a skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture,” which is certainly a mouthful, if not a particularly enlightening one. Osteoporosis is the most common bone disease by far, but it's a disease many people don't understand.

Most people think of osteoporosis only in terms of bone fractures or loss of height, but osteoporosis is far more complicated. You'd probably understand osteoporosis most clearly if you could see a bone specimen affected by osteoporosis under the microscope, but you're not likely to ever be privy to a bone biopsy. Doctors don't usually perform bone biopsies in their patients to diagnosis osteoporosis, although pathological examination of bone is still the gold standard in diagnosing osteoporosis. Normal bone has a network of strong plates and bands. In osteoporosis the bands become thinner and weakened, and worse yet there are tiny breaks in the plates and bands.



Another way to define osteoporosis is that osteoporosis is present if bone mineral testing value is more than 2.5 standard deviations below the average adult, even if there's no history of fractures. (See Chapter 9 for more on bone mineral density tests.)



The word “osteoporosis” actually means *porous bones*. If something is porous, it has holes in it. Although all bone has cavities filled with cells and blood (see Chapter 2 for more information on bone biology), in osteoporosis, the normal bony cavities enlarge. When the “holes” become larger, bone becomes more fragile and more susceptible to breaking. Minimal trauma can cause a fracture when you have osteoporosis. Osteoporosis is a systemic disorder that affects the entire skeleton.

Bone is in a constant state of *remodeling*; old bone is broken down and replaced with new bone (see Chapter 2 for more on how bone is built). Osteoporosis can occur when you lose more bone than you rebuild, or when more bone than normal is broken down. (See Chapter 3 for risk factors that are responsible for changes in your bone density.)

Bone mass decreases between 1 and 5 percent per year after age 40 in women, and less than 1 percent in men. Women are more likely to develop osteoporosis because they generally have less bone mass to start with than men do. The sudden loss of *estrogen*, a sex hormone that is instrumental in building healthy bone, in menopause also contributes to women's increased risk of osteoporosis.

Who, Me? How Osteoporosis May Affect You

If you're reading this book, you may already be proactive about your bone health. Maybe you already know that you need to change your diet, exercise more, and take that extra calcium

supplement. This book can help those of you who want to prevent osteoporosis. If you already have osteoporosis, this book can explain the ways to treat it and to prevent it from worsening.

To emphasize just how common the problem of osteoporosis is, a recent report from the Surgeon General's office stated that by the year 2020, half of all Americans older than age 50 will be at risk for fractures from osteoporosis. Of women now age 50 or older, 40 percent will suffer a fracture of the hip, wrist, or spine at some point in their lives.

Your co-author Sharon works with a population of patients who are older than 60 years of age. Part of her job includes weighing and measuring each patient. Invariably, nearly every person laments that they used to be taller than they are now. (Thinner too, but that's another issue!)

Losing height used to be considered an inevitable part of aging, similar to wrinkles and age spots. Most people don't realize that one cause of height loss is related to fractures in the spinal column called *vertebral compression fractures*. Between 60 and 70 percent of women older than age 65 have at least one of these fractures.

Even worse, studies show that 20 percent of people with a vertebral fracture will sustain another fracture within a year. And people with compression fractures have a relative risk of death that is nine times higher than their healthy counterparts.

If you're one of the 28 million Americans who currently have osteoporosis, or one of the 18 million who have low bone mass and are likely to develop osteoporosis in the future, don't despair! Even if you've already broken a bone or two, you can take some steps to decrease your odds of fracture in the future. This book can help you implement those changes in your life.

Looking more closely at the numbers: How serious is osteoporosis?

Statistics related to osteoporosis are staggering. Consider just a few from the 2004 Surgeon General's report:

- ✓ Around 1.5 million people have a fracture related to osteoporosis each year.
- ✓ Hip fractures are responsible for 300,000 hospitalizations each year.

- ✔ Up to 700,000 vertebral compression fractures and 250,000 wrist fractures occur in the United States each year.
- ✔ The cost for treating osteoporotic fractures each year is around \$18 *billion* — \$38 million a day.
- ✔ Approximately 20 percent of seniors who suffer a hip fracture will die within one year.
- ✔ Around 20 percent of seniors with a hip fracture will be in a nursing home within a year.
- ✔ White women older than age 65 are twice as likely to fracture something as African American women. Latino women's fracture rates fall between the two groups.
A woman's risk of hip fracture is equal to her risk of developing breast, uterine, and ovarian cancer combined.
- ✔ By the year 2050, men will have one half of all hip fractures in the United States.

Defeating fragility fractures before they occur

You can't see or feel changes in your bone strength over time. In other words, osteoporosis is a disease without warning signs. After you've experienced your first *fragility fracture*, a fracture that occurs after an event that normally wouldn't be traumatic enough to cause a fracture, you've already lost a significant amount of bone density.

Fragility fractures are strong predictors for another fracture in the future. If you have a fragility fracture, you need thorough evaluation and treatment by someone who specializes in osteoporosis (see Chapter 8 for more on choosing a doctor to treat osteoporosis).

The first outward sign of osteoporosis could be a devastating hip fracture or spinal compression fracture. But you can avoid these breaks. How, you may ask?

Your doctor can detect osteoporosis before that first break! A simple new kind of X-ray known as *Dual Energy X-ray Absorptiometry (DXA)*, also known as *bone densitometry*, can measure your bone density. Your doctor then uses this information to predict the likelihood of a future fragility fracture. (See Chapter 9 for more information about DXA scans.)



After you've had a baseline bone mineral density test, your doctor may ask you to repeat the test every two years to see how your bones are holding up to the stress of aging.

Uncovering the relationship between aging and osteoporosis

Bones, like Rome, weren't built in a day. It takes years to build up your bone density, and your behaviors, both good and bad, during the time of peak bone development can impact the amount of bone you end up with.

Your bones actually remodel and reshape themselves throughout your lifetime, something that most people don't even notice until something goes wrong. You may wonder why a process that seems to progress painlessly (with any luck at all) from birth to around age 45 suddenly seems to fall apart at the bones, as it were.



By the time you reach the age of 35 or so, you've amassed all the bone you'll ever have. Several factors, such as heredity, your diet, your exercise levels, and whether you smoke, drink alcohol, or have any other "bad" habits, determine your peak bone mass. (See Chapter 3 for more on determining your risk factors.)

After age 35, you can maintain the bone mass you already have, but you can't increase your peak bone mass. For women, the start of menopause, with its sudden drop in estrogen is the start of accelerated bone loss. For men, bone loss happens later in life. (Check out Chapter 4 for more on men and osteoporosis.)

Suddenly the bone you're building isn't keeping pace with the bone that's being broken down. The various medications used to treat osteoporosis affect this delicate balance. (See Chapter 10 for more on osteoporosis and medications). You can also achieve improvement in bone strength by doing weight-bearing exercises (see Chapter 6) and by taking in enough calcium and vitamin D (see Chapter 5).

Why Early Diagnosis Is So Important



The earlier you start preventing and treating osteoporosis, the better your chances of preserving bone. Waiting until you've broken a bone and then trying to "catch up" on bone strength isn't nearly as effective as building good bone in your early years.

Unfortunately, the peak bone-building years coincide with the years where people sometimes ignore health issues. Given that most 25-year-olds aren't terribly concerned with their bones, the next best way to get people to pay attention to their bones is to diagnose problems early enough to catch and treat little problems before they become big ones.

Keep a close eye on your young children and grandchildren. Even though kids do break bones, it doesn't mean they have osteoporosis. In fact, not all fractures are a fragility fracture. However, a child who breaks several bones within a year needs to be tested for possible bone disease (see Chapter 4 for more on children and osteoporosis), unless the child in question has a propensity for jumping off roofs or otherwise taking increased risks.



If you have known risk factors, such as long-term use of corticosteroids or a strong family history of osteoporosis, don't wait until you're wearing your first cast to find out if you have osteoporosis. Talk to your doctor and ask to have a baseline bone density test, and make sure that your diet includes the recommended amount of calcium and vitamin D for your age group. And don't forget to exercise! (Remember that bone loss occurs every year after menopause unless you're taking steps to prevent it.)

Many situations increase your risk for developing osteoporosis. Knowing some of them can get you started off in the right direction for an early diagnosis and prevention. Some important risk factors are in the following list:

- ✓ Chronic illnesses, such as liver or kidney disease
- ✓ Chronic use of corticosteroids, such as prednisone
- ✓ Difficulty absorbing nutrients due to problems with your stomach or intestines
- ✓ Estrogen or testosterone deficiencies
- ✓ Excessive use of tobacco or alcohol
- ✓ Low body weight
- ✓ Periods of immobilization

Improving Your Peak Bone Density — And Your Children's

If more Americans truly practiced prevention instead of searching for a cure after the inevitable has happened, everyone would be a lot healthier.

This statement is as true with osteoporosis as with other diseases. For example, if people spent $\frac{1}{100}$ of the time trying to build a good peak bone density up to age 25 or 30, many of them wouldn't have to worry about what drug to take to cure their osteoporosis.

Your bone density potential is partly determined by hereditary factors, and partly by environmental factors. Many experts today are especially concerned that today's children are going to suffer from osteoporosis due to a number of problems. What are they?

- ✔ Children spend more time sitting (as in front of the computer) and less time exercising.
- ✔ Children spend more time indoors and therefore receive less exposure to vitamin D, a vitamin necessary for bones.
- ✔ Teenage girls usually have to deal with peer pressure to stay as thin as possible.
- ✔ Children are substituting soft drinks for milk.
- ✔ More teens are smoking.
- ✔ Some teenage girls also exercise too strenuously, attempting to keep weight down or to attain success in weight-driven sports, such as ballet or gymnastics. (See Chapter 4 for more on this condition known as *female athlete triad*.)



Studies show that adolescents who take in less than 1,000 milligrams of calcium daily (boys) and 850 milligrams (girls) of calcium won't achieve their optimal bone mass.

If you're already older than 30, you can try and build strong bones in your children and grandchildren by encouraging them to get up off their bottoms and go outside and run around. (See Chapter 4 for more about children and osteoporosis.) You can feed them — and yourself — nutritious meals and set a good example by drinking your milk. In fact, teens make nearly one-third of their spinal peak bone mass during adolescence, yet their eating habits often aren't focused upon bone building, especially among teenage girls concerned about their weight.



Certainly knowing your family history is important. Look at your family photographs for changes in your relatives' spines. If you know that your grandma and mom both had osteoporosis, make sure that you avoid the dangerous habits of cigarette smoking and excess alcohol consumption.

Evaluating Osteoporosis Therapy

The goal of therapy for osteoporosis is to reduce fractures, because fractures do much more than break bone. Fractures can change a person's life, or possibly end it prematurely. In fact, people who suffer from hip fractures have a higher chance of dying because the surgery increases your risk of getting pneumonia or blood clots in your lungs. The pain and suffering from osteoporosis costs billions of dollars of treatment in the United States alone.

All treatment, whether it be preventive or therapeutic and whether it involves taking medication or just getting up off the couch and exercising, is aimed at preventing fractures caused by weak bones. Unfortunately studies in the United States have shown that many patients who have had a hip fracture weren't tested or treated for osteoporosis.

This book tells you about how doctors can diagnose osteoporosis early and how they can treat osteoporosis. Hence, we're delighted that you've decided to read our book and bone up on osteoporosis, because our goal is to prevent the breaks that can shatter far more than just bone. (Check out Chapter 9 that focuses on testing your bones and Chapter 10 that focuses on different prescription medications to help your osteoporotic bones.)

Terminology 101: Keeping Your "Osteos" Straight

The word "osteo" is derived from the Greek word for *bone*. Many medical conditions and terms start with this same Greek word, and they focus on bones. However, the different "osteo" conditions really have little to do with one another. In this section we try to help you determine the differences between osteoporosis and the other "osteos" you may encounter.

Osteoarthritis: It hurts, but it's not osteoporosis

Osteoporosis and *osteoarthritis* are both common conditions in people older than 65, but these two conditions are completely different problems.

Osteoarthritis is a problem that affects your joints. It results from the loss of the cartilage that acts as a cushion between the joints

of your bones. Osteoarthritis causes pain in your joints and has nothing to do with osteoporosis, even though both words start with “osteo.” Perhaps, if the medical community used the phrase “degenerative joint disease,” for osteoarthritis, people wouldn’t confuse the two.

More than 20 million Americans have osteoarthritis; before age 45, more men than women have osteoarthritis, but after age 55, osteoarthritis affects more women than men.

The joints most commonly affected in osteoarthritis are certain joints in the fingers, feet, spine, hips, and knees. Repeated trauma to the joints can cause osteoarthritis. Osteoarthritis causes pain and stiffness in the joints; swelling and warmth can also occur. If you have pain and stiffness in your joints after sitting for long periods, you could have osteoarthritis. Sometimes a consultation with a rheumatologist is necessary for confirmation. (Refer to www.rheumatology.org to see exactly what a rheumatologist does.)

Treatment for osteoarthritis includes anti-inflammatory drugs, such as ibuprofen (Motrin) and naproxen (Aleve), aspirin, or acetaminophen (Tylenol). Physical therapy, mild exercise, and weight loss, if you’re overweight, can also help osteoarthritis.

Osteomalacia: So why exactly did that bone break?

Osteomalacia is an illness that also causes fragility fractures, but it’s much less common than osteoporosis. If you have a broken bone, you may think quibbling about whether your fracture was caused by osteoporosis or *osteomalacia* is silly. But the treatment for each can be different, so you and your doctor need to know which condition is affecting your bones.

Osteomalacia is primarily a disorder of decreased bone mineralization. Your doctor can diagnose *osteomalacia* with a bone biopsy or by history, physical examination, laboratory, and radiological studies.

So what exactly are the differences between the two? Osteoporosis usually occurs in a population with certain risk factors; they’re postmenopausal women, people older than age 65, or patients who have been on long-term corticosteroid therapy. Osteoporosis patients generally have normal blood levels of calcium, phosphate, vitamin D, and parathyroid hormones, to name a few. Patients with *osteomalacia* may have low levels of vitamin D, calcium, and phosphates, and high levels of parathyroid hormones.

In osteoporosis, the amount of bone mass you have is reduced, making your bones more porous, but the mineral makeup of the bone is normal. Because the bones have less mass, they're fragile. In osteomalacia, the bones themselves are soft and brittle, because their mineral content is abnormal.

Sometimes the only way to distinguish between osteoporosis and osteomalacia is through a bone biopsy. You can have a bone biopsy as an outpatient procedure; typically your doctor samples a bit of bone from your *iliac crest* (the bony protrusion near your hip just below your waist).



Always remind your doctor to define your problem precisely and consider other causes of reduced bone density.

Osteopenia warning: Falling bone density ahead!

Osteopenia is a word that has come to be identified with a numerical reading on your bone density. You have had some bone density loss, but not a lot. It could be a forerunner or warning sign of further bone loss and fractures due to bone loss.

Your doctor can diagnose osteopenia when your bone density tests results show that you have a lower bone density than normal, but not enough to diagnose you with osteoporosis. Dr. O'Connor remembers a time when osteopenia had a different meaning. It meant that your X-rays showed a reduction in bone density. Most doctors don't use osteopenia this way anymore, because they have adapted to the terminology used in reading bone densities.

Understand that osteopenia really doesn't tell you much about why your bone density might be low. It's merely a numerical value obtained from a bone density report.



We describe bone density and the ways to test for it more thoroughly in Chapter 9, but a quick way to describe the difference between osteopenia and osteoporosis is that osteopenia is a range of 1 to 2.5 standard deviations below the norm on a bone density test, and anything higher than 2.5 standard deviation is osteoporosis.