

Bone Density Testing

When you have osteoporosis, your bones become weak and are more likely to break (fracture). You can have osteoporosis without any symptoms. Because it can be prevented and treated, an early diagnosis is important. However, you can take steps at any age to protect your bones and reduce your chance of breaking a bone. You can find out whether you have osteoporosis or if you should be concerned about your bones by getting a bone density test. Some people also call it a bone mass measurement test. This test uses a machine to measure your bone density. It estimates the amount of bone in your hip, spine and sometimes other bones. Your test result will help your healthcare provider make recommendations to help you protect your bones.

What a Bone Density Test Can Do

A bone density test tells you if you have normal bone density, low bone density (osteopenia) or osteoporosis. It is the only test that can diagnose osteoporosis. The lower your bone density, the greater your risk of breaking a bone. A bone density test can help you and your healthcare provider:

- learn if you have weak bones or osteoporosis before you break a bone
- predict your chance of breaking a bone in the future
- see if your bone density is improving, getting worse or staying the same
- find out how well an osteoporosis medicine is working
- let you know if you have osteoporosis after you break a bone

Who Should Have a Bone Density Test?

Certain people are more likely than others to develop osteoporosis and broken bones. Factors that increase the likelihood of developing osteoporosis are called “risk factors.” The more risk factors you have, the more likely you are to break a bone. Many of the risk factors for osteoporosis and broken bones are listed on Table 1 (see page 2). These risk factors include many of the medicines and medical conditions that can cause bone loss.

The National Osteoporosis Foundation (NOF) recommends that you have a bone density test if:

- you are a woman age 65 or older
- you are a man age 70 or older
- you break a bone after age 50
- you are a woman of menopausal age with risk factors (see page 2)
- you are a postmenopausal woman under age 65 with risk factors (see page 2)
- you are a man age 50-69 with risk factors (see page 2)

A bone density test may also be necessary if you have any of the following:

- an X-ray of your spine showing a break or bone loss in your spine
- back pain with a possible break in your spine
- height loss of ½ inch or more within one year
- total height loss of 1½ inches from your original height

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Common Risk Factors for Bone Loss and Osteoporosis*

Common Risk Factors for Osteoporosis*

- Older age
- Being female
- Having reached menopause
- Family history of broken bones
- Being small and thin

Medicines That May Cause Bone Loss*

- Steroid medicines (cortisone & prednisone)
- Thyroid hormones (excess)
- Anti-seizure medicines (some)
- Aromatase inhibitors
- Certain cancer medicines
- Gonadotropin releasing hormone (GnRH)
- Proton pump inhibitors (PPIs)
- Selective serotonin reuptake inhibitors (SSRIs)
- Thiazolidinediones
- Depo-Provera®

Medical Conditions That May Cause Bone Loss*

- Autoimmune disorders such as ankylosing spondylitis, rheumatoid arthritis, lupus and multiple sclerosis
- Endocrine disorders such as diabetes, hyperparathyroidism, hyperthyroidism and low testosterone levels in men
- Digestive disorders such as celiac disease, inflammatory bowel disease and weight loss surgery
- Hematologic disorders such as multiple myeloma and sickle cell disease
- Neurological disorders such as stroke, multiple sclerosis and Parkinson's disease
- Other disorders including chronic kidney disease, depression, certain cancers, HIV and eating disorders

*These lists do not include all possible causes of bone loss and osteoporosis.

Types of Bone Density Tests

Central DXA

NOF recommends a bone density test of the hip and spine using a central DXA machine to diagnose osteoporosis. DXA stands for dual energy x-ray absorptiometry. When testing can't be done on the hip and spine, NOF suggests a central DXA test of the radius bone in the forearm (wrist). In some cases, the type of bone density testing equipment used depends on what is available in your community.

Healthcare providers measure bone density in the hip and spine for several reasons. First, people with osteoporosis have a greater chance of breaking these bones. Second, broken bones in the hip and spine can cause more serious problems, including longer recovery time, greater pain and even disability. Bone density in the hip and spine can also predict the likelihood of future breaks in other bones.

Bone density tests are non-invasive, painless and usually take less than 15 minutes. You can usually remain fully dressed during the test. A central DXA uses very little radiation. You are actually exposed to 10–15 times more radiation when you fly roundtrip between New York and San Francisco. When repeating a bone density test, it is best to use the same testing equipment and have the test done at the same place each time. This provides a more accurate comparison with your last test result. Unlike bone density tests, X-rays are not able to show osteoporosis until the disease is well advanced.

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Screening Tests

Also called peripheral tests, screening tests measure bone density in the lower arm, wrist, finger or heel. The types of peripheral tests are:

- pDXA (peripheral dual energy x-ray absorptiometry)
- QUS (quantitative ultrasound)
- pQCT (peripheral quantitative computed tomography)

Screening tests can help identify people who are most likely to benefit from further bone density testing. They are also useful when a central DXA is not available. Screening tests cannot accurately diagnose osteoporosis and they should not be used to see how well an osteoporosis medicine is working. If you have a peripheral bone density test, you should follow up with your healthcare provider. Discuss whether you need additional testing, such as a central DXA test of the hip and/or spine. The results of a peripheral test cannot be compared with the results of a central DXA.

Other Important Factors

People of Larger Size

Most central DXA machines cannot measure bone density in the hip and spine of patients who weigh more than 300 pounds. Some newer machines can measure bone density in people who weigh up to 400 pounds, but these machines are not widely available. When the hip and spine cannot be measured, some healthcare providers recommend a central DXA test of the radius bone in the forearm and a peripheral bone density test of the heel or another bone. Doing both of these tests might provide more complete information.

Where to Have a Bone Density Test

Most people need a prescription or referral from their healthcare provider to have a bone density test. If you're not sure where to go for a bone density test, contact your healthcare provider or your insurance plan to find out where the test is available. Also, most hospital radiology departments, private radiology groups and some medical practices offer bone density testing.

When you go for your appointment, be sure to take the prescription or referral with you. The testing center will send your bone density test results to your healthcare provider. You may want to make an appointment to discuss your results with your healthcare provider.

How Often to Repeat a Bone Density Test

People taking an osteoporosis medicine should repeat their bone density test by central DXA every one to two years. After starting a new osteoporosis medicine, many healthcare providers will repeat a bone density test after one year.

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Tests to Find Broken Bones

An x-ray is the most common way to tell if you have broken a bone in your spine or another bone. Breaks in the spine do not always cause pain. Your healthcare provider may order an x-ray to look for broken bones in your spine if:

- you lose about 1/2 inch or more of height in one year
- you develop stooped or hunched posture
- you have back pain
- you lose more than 1½ inches from your original height

A vertebral fracture assessment (VFA) can show breaks in the spine as well as other problems. This test can be done on a DXA machine and uses less radiation than a standard x-ray. If you break a bone in the spine, there's a greater chance that you will break more bones in the spine. Here are some things you can do:

- have a bone density test
- talk to your healthcare provider about treatment options
- talk to your healthcare provider about other steps you can take to reduce your risk of breaking bones in the future

Understanding Bone Density Test Results

Your bone density test results are reported using T-scores. A T-score usually shows how much your bone density is higher or lower than the bone density of a healthy 30-year old adult. A healthcare provider looks at the lowest T-score to diagnosis osteoporosis. The lower a person's T-score, the lower the bone density. A T-score of -1.0 is lower than a T-score of 0.5 and a T-score of -3.5 is lower than a T-score of -3.0.

What Your T-score Means. According to the World Health Organization (WHO):

- A T-score of -1.0 or above is **normal bone density**. Examples are 0.9, 0 and -0.9.
- A T-score between -1.0 and -2.5 means you have **low bone density or osteopenia**. Examples are T-scores of -1.1, -1.6 and -2.4.
- A T-score of -2.5 or below is a diagnosis of **osteoporosis**. Examples are T-scores of -2.6, -3.3 and -3.9.

Your bone density test result also includes a Z-score that compares your bone density to what is normal in someone your age and body size. Among older adults low bone mineral density is common, so Z-scores can be misleading. Z-scores are more helpful for evaluating children, teens, women still having periods and younger men. NOF does not recommend routine bone density testing in these age groups. A Z-score above -2.0 is normal according to the International Society for Clinical Densitometry (ISCD). A diagnosis of osteoporosis in younger men, premenopausal women and children should not be based on a bone density test result alone.

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When to Consider Treatment

The results of a bone density test help your healthcare provider make recommendations about what you can do to reduce your chance of breaking a bone. When making a decision about treatment with an osteoporosis medicine, your healthcare provider will also consider your risk factors for osteoporosis, your likelihood of breaking a bone in the future, your medical history and your current health.

Below are treatment guidelines for postmenopausal women and men age 50 or older:

- Most people with T-scores of -1.0 and above (normal bone density) do not need to take an osteoporosis medicine.
- Some people with T-scores between -1.0 and -2.5 (low bone density or osteopenia) should consider taking an osteoporosis medicine when they have certain risk factors.
- All people with T-scores of -2.5 and below (osteoporosis) should consider taking an osteoporosis medicine.

What About Low Bone Density?

Having low bone density or osteopenia does not mean you will get osteoporosis. It means you have a greater chance of developing osteoporosis if you lose bone in the future. While we've known that people with osteoporosis should consider treatment to reduce the risk of broken bones, it hasn't always been clear when to treat people who have low bone density.

The online fracture risk assessment tool called FRAX® can assist healthcare providers with these decisions. FRAX is a tool that estimates the chance that a person will break a bone in the next ten years. FRAX can help to identify people who have a greater chance of breaking a bone as well as people who might benefit from taking an osteoporosis medicine.

FRAX looks at a person's age, bone density and other risk factors to estimate their chance of breaking a hip or other major bone in the next 10 years. If you have low bone density, your DXA report may include your FRAX score along with your bone density. If it doesn't, your healthcare provider can find out your FRAX score using a web-based version. The FRAX tool can be used to guide decisions about treatment in postmenopausal women or men age 50 and older who have low bone density and have not recently taken an osteoporosis medicine.

Osteoporosis medicines are prescribed to reduce the risk of broken bones. NOF encourages you to discuss your treatment options with your healthcare provider. Always look at both the risks and benefits of taking a medicine, including potential side effects. If you take an osteoporosis medicine, you still need to get enough calcium and vitamin D and to exercise in order for it to work.

For additional information, visit the NOF Web site at www.nof.org.