



Colorado Center for
BONE RESEARCH

BONE DENSITY TEST

BONE MINERAL DENSITY (BMD) TESTING - WHAT THE NUMBERS MEAN

People can have osteoporosis without any signs or symptoms. When you have osteoporosis, your bones become weak and are more likely to break. Because it is a disease that can be prevented and treated, an early diagnosis can make a difference. In the past, osteoporosis could only be detected after you broke a bone.

A bone density test makes it possible to know if you are at risk for breaking bones before it happens. You can find out whether you have osteoporosis or if you should be concerned about your bones by getting a bone mineral density (BMD) test. A bone density test (also called densitometry or DXA scan) uses x-rays to measure how many grams of calcium with other bone minerals are packed into a segment of bone. A bone density test is a fairly accurate predictor of your risk of future fracture. Bone density testing can be done on different bones of your body, including your hip, spine, forearm (between the wrist and elbow), wrist, finger and heel. A BMD test is safe and painless, and it provides important information about your bone health. Your healthcare provider uses this information to make decisions regarding your treatment.

If you are diagnosed with osteoporosis, your healthcare provider may order laboratory and other tests. These tests can help your healthcare provider find out if you have another medical condition causing bone loss.

Why the Test is Performed

A BMD test is the only way to detect low bone density and diagnose osteoporosis. A bone density test can:

- Detect low bone density before a person breaks a bone
- Predict a person's chances of breaking a bone in the future
- Confirm a diagnosis of osteoporosis when a person has already broken a bone
- Determine whether a person's bone density is increasing, decreasing or remaining stable (the same)
- Monitor a person's response to treatment

Who Should Have a BMD Test?

Guidelines recommend screening for those who are thought to be at increased risk for osteoporosis.

- A woman over age 65 or older and men over age 70
- A postmenopausal woman under age 65 and men ages 50 – 70 who have risk factors such as:
- A fracture in any man or woman over age 50
- Chronic rheumatoid arthritis, chronic kidney disease, eating disorders
- Loss of sex hormones at an early age, including early menopause
- A history of hormone treatment for prostate or breast cancer
- Significant loss of height
- Smoking
- Overactive thyroid gland (hyperthyroidism) or taking high doses of thyroid hormone medication
- Overactive parathyroid gland (hyperparathyroidism)
- X-ray of the spine showing a fracture or bone loss
- Taking corticosteroid medications (prednisone, methylprednisolone) every day for more than 3 months
- Three or more drinks of alcohol per day on most days

Types of Bone Density Tests

Several different kinds of machines can do BMD testing. The most common method, called a DEXA scan, uses low dose x-rays (about 1/10 the radiation dose of a chest x-ray).

While you are lying on a cushioned table, a scanner passes over your body. Many authorities recommend a BMD test of the hip and lower spine. This is called a central DXA scan. DXA stands for dual energy x-ray absorptiometry. In most cases you won't need to undress. The test usually takes less than 15 minutes. BMD tests are non-invasive, meaning that no needles or instruments are placed through the skin or body.

When testing can't be done on the hip and spine, a central DXA test of the radius bone in the forearm may be performed. In some cases, the type of bone density testing equipment used depends on what is available in your community.

Healthcare providers measure BMD in the hip and spine for several reasons. First, people with osteoporosis have a greater chance of fracturing these bones. Second, these fractures can cause more serious problems, including longer recovery time, greater pain and even disability. BMD tests results in the hip and spine can predict the likelihood of future fractures in other bones.

When repeating a BMD test, it is best to use the same testing equipment and have it done at the same facility. This provides a more accurate comparison with your last test result.

Although it is not always possible to have your BMD test at the same place, it is still important to compare your current BMD test to your last one.

There are smaller machines that just measure the bone density in your wrist, fingers leg, or heel. You may find these in pharmacies, shopping centers, and health fairs. However, the results from these other methods are not equivalent to the results from a central DXA machine.

Healthcare providers do not routinely use standard x-rays for BMD testing. While x-rays can identify broken bones, they are not sensitive enough to detect osteoporosis until 25 to 40 percent of bone density has been lost. By this time the disease is well advanced.

Where You Can Have a BMD Test

To have a BMD test done, in most states, you need to get a prescription (also called an order or referral) from your healthcare provider. Your healthcare provider can often recommend a place to have your BMD test. Most hospital radiology departments, private radiology groups and some medical practices offer BMD testing. You may also want to check with your health insurance plane.

When you go for your appointment, be sure to take the prescription with you to give to the testing facility. Remove all jewelry before the BMD test. Inform your healthcare provider if you may be pregnant. After your test, the testing facility will send your BMD test result to your healthcare provider. Your healthcare provider will then share the results with you.

How Often to Repeat a BMD Test

People taking an osteoporosis medication should repeat their BMD test by central DXA every two years. Some healthcare providers may have certain patients repeat their BMD test after one year.

Tests to Find Broken Bones

If you have a loss of height, posture changes or back pain, your healthcare provider may order an x-ray to look for fractures in your spine. An x-ray is the most common way to tell if you have a broken bone in your spine or other bones. In some people, spine fractures don't cause any pain.

Once you have a fracture in the spine, you are at greater risk for more spine fractures in the future. If you have type of fracture, you need to speak with your healthcare provider about steps to protect your spine. You should also consider treatment with an osteoporosis medication. When you have a fracture in the spine, you still need to have a BMD test if you haven't had one.

Another way to find fractures in the spine is with a vertebral fracture assessment (VFA) by a DXA machine. This method uses less radiation than a standard x-ray. VFAs can show breaks in the spine and can also show the difference between broken bones and abnormally shaped bones.

Understanding BMD Test Results

When you have a bone mineral density test, it compares your bone mineral density to a "young normal" healthy 30-year old adult with peak bone density (also called peak bone mass). Peak bone density is the point at which a person has the greatest amount of bone that she or he will ever have.

The results of your BMD test are usually reported as a “T-score” and “Z-score.”

- The T-score compares your bone density with that of healthy young women.
- The Z-score compares your bone density with that of other people of your age, gender and race.

In either score, a negative number means you have thinner bones than the standard. The more negative the number, the higher your risk of a bone fracture. Healthcare providers use the T-score to diagnose osteoporosis. If more than one bone is tested, they use the lowest T-score to make a diagnosis of osteoporosis.

A T-score is within the normal range if it is -1.0 or above

What about Abnormal Results?

- A T-score between -1 and -2.5 indicates the beginning of bone loss (osteopenia).
- A T-score below -2.5 indicates osteoporosis.

Healthcare providers do not use Z-scores to diagnose osteoporosis in postmenopausal women and men age 50 and older. Among older adults low bone mineral density is common, so Z-scores can be misleading. An older person might have a “normal” Z-score but still be at high risk for fracture.

Bone mineral density testing does not diagnose fractures. However, along with other risk factors you may have, it helps predict your risk of having a bone fracture in the future.

A method called Fracture Risk Assessment (FRAX) helps healthcare providers and their patients age 40 or older make better decisions about when to take an osteoporosis medication. FRAX estimates a person’s chance of breaking a bone over a period of 10 years. Postmenopausal women and older men with osteoporosis are at greatest risk of breaking a bone.

In the past, healthcare providers knew to treat people with osteoporosis, but were sometimes uncertain about when to treat patients with osteopenia. The FRAX method makes it easier for healthcare providers and their patients with osteopenia to decide when an osteoporosis medication is necessary. This method helps make sure that people with the greatest chance of breaking a bone get treated.

Healthcare providers can get a patient’s FRAX by using a special web-based tool on a computer in their office. The healthcare provider enters a patient’s hip T-score and certain risk factors for osteoporosis. The tool predicts the patient’s absolute fracture risk. Soon some central DXA (dual energy x-ray absorptiometry) machines will be able to provide this information.

Risks

BMD testing involves exposure to a low level of radiation. Most experts feel that the risk is very low compared with the benefits of identifying osteoporosis before you break a bone.

When to Consider Treatment

The results of the BMD test help your healthcare provider make recommendations about either prevention or treatment of osteoporosis. When making a decision about treatment with an osteoporosis medication, your healthcare provider will also consider your risk factors for osteoporosis, your likelihood of having future fractures, 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 and above (normal bone density) do not need to take an osteoporosis medication.
- People with T-scores between -1 and -2.5 (osteopenia) should consider taking an osteoporosis medication when they have certain risk factors.
- All people with T-scores of -2.5 and below (osteoporosis) should consider taking an osteoporosis medication.

Osteoporosis Medications either slow or stop bone loss or rebuild bone. They also reduce the chances of having a broken bone. Discuss your treatment options with your healthcare provider. Always look at both the risks and benefits of taking a medication, including potential side effects.

For an osteoporosis medication to work, a person still needs to get enough calcium and vitamin D and to exercise. Adults under age 50 need 1,000 mg of calcium and 400-800 IU of vitamin D₃ daily.

Dr. Paul Miller recommends that adults 50 and over take 1,500 – 2,000 mg of calcium and 1,000 – 2,000 IU of vitamin D₃ daily.

Vitamin D₃ is the form of Vitamin D that best supports bone health.

Sources: Paul D Miller, MD; National Osteoporosis Foundation Publication