

What is Bone Densitometry?

Every day, physicians use radiography, or x-rays, to view and evaluate bone fractures and other injuries of the musculoskeletal system. However, a plain x-ray test is not the best way to assess bone density. To detect osteoporosis accurately, doctors use an enhanced form of x-ray technology called dual-energy x-ray absorptiometry (DXA or DEXA). DEXA bone densitometry is today's established standard for measuring bone mineral density (BMD). DEXA is a quick, painless procedure for measuring bone loss. Measurement of the lower spine, hips and wrist are most often done. Assessment of vertebral fractures is done with IVA imaging if this is needed.

What are some common uses of the procedure?

DEXA bone densitometry is most often used to diagnose osteoporosis, a condition that often affects women after menopause but may also be found in men. Osteoporosis involves a gradual loss of calcium, causing the bones to become thinner, more fragile and more likely to break. The DEXA test can also assess your risk for developing fractures. If your bone density is found to be low, you and your physician can work together on a treatment plan to help prevent fractures before they occur. DEXA is also effective in tracking the effects of treatment for osteoporosis or for other conditions that cause bone loss. Bone density testing is strongly recommended if you:

- are a post-menopausal woman and not taking estrogen.
- have a personal or maternal history of hip fracture.
- have a history of tobacco or heavy alcohol use.
- are a post-menopausal woman who is tall (over 5 feet 7 inches) or thin (less than 125 pounds).
- are a man with clinical conditions associated with bone loss, like treatment for prostate cancer.
- use medications that are known to cause bone loss, including corticosteroids such as Prednisone, various anti-seizure medications such as Dilantin and certain barbiturates, or high-dose thyroid replacement drugs.
- have type 1 (formerly called juvenile or insulin-dependent) diabetes, liver disease, kidney disease or a family history of osteoporosis.
- have high bone turnover, which shows up in the form of excessive collagen in urine samples.
- have a thyroid condition, such as hyperthyroidism
- have experienced a fracture after only mild trauma.

- have had x-ray evidence of vertebral fracture or other signs of osteoporosis.

How should I prepare for the procedure?

On the day of the exam eat normally, but don't take calcium supplements for at least 24 hours beforehand (calcium may show up as an artifact on the bone density test). Wear loose, comfortable clothing, avoiding garments that have zippers, belts or buttons made of metal.

Inform your physician if you recently had a barium examination or have been injected with a contrast material for a computed tomography (CT) scan or radioisotope scan; you may have to wait 10 to 14 days before undergoing a DEXA test. Women should always inform their physician or x-ray technologist if there is a possibility they are pregnant.

What does the DEXA equipment look like?

There are two types of DEXA equipment: the central device and the peripheral device. Central DEXA devices measure bone density in the hip and spine, while peripheral devices measure it in the wrist, heel or finger. The central DEXA device is used in hospitals and medical offices, while the smaller peripheral device is available in drugstores and on mobile health vans in the community. CT scanners also can be used effectively to evaluate the spine and hip for osteoporosis.

Central devices have a large, flat table and an "arm" suspended overhead. The arm swings away so that the table can be used as a treatment table or exam chair for routine patient examinations. The peripheral DEXA (pDEXA) device weighs only about 60 pounds. It is a portable box-like structure that includes a space to insert your foot or forearm for imaging.

How does the procedure work?

The DEXA machine sends a thin, invisible beam of low-dose x-rays with two distinct energy peaks through your bones. One peak is absorbed mainly by soft tissue and the other by bone. The soft tissue amount can be subtracted from the total and what remains is a patient's bone mineral density

All devices feature special software to compute the data and display them on a computer monitor, allowing your doctor to make an accurate diagnosis. The amount of radiation used is extremely small—less than one-tenth the dose of a standard

chest x-ray.

How is the procedure performed?

The DEXA bone density test takes 10 to 30 minutes, depending on the equipment used and the parts of the body being examined. You may be asked to undress and put on a hospital gown. Then you'll lie on a padded table with an x-ray generator below and a detector (an imaging device) above.

Most often, doctors focus on bone loss in the spine and hip where most osteoporosis-related fractures happen. During an examination of the spine, your legs will be supported on a padded box to flatten your pelvis and lower (lumbar) spine. To assess your hip, the technologist will place your foot in a brace that rotates the hip inward. In both cases the detector is slowly passed over the area, generating images on a computer monitor.

The peripheral DEXA (pDEXA) test is even simpler. You place your finger, hand, forearm or foot in a small device, and a bone density reading is obtained within a few minutes. These tests may not be as sensitive—especially in younger people—and cannot be used to monitor response to treatment.

Lateral Vertebral Assessment (LVA)

An additional procedure called Lateral Vertebral Assessment (LVA) is now being done at many centers. This is a low dose x-ray examination of the spine to screen for vertebral fractures. It is performed on the DEXA machine. Vertebral fractures are common in older individuals and may indicate increased risk for additional fractures if they are present. They are often asymptomatic. The test is painless and adds only a few minutes to the DEXA procedure. It may be recommended for older patients, especially if they have lost more than an inch of height, have unexplained back pain, or if the DEXA scan gives borderline readings and the increased risk if the patient has evidence of fracture would influence the decisions in regard to treatment.

What will I experience during the procedure?

DEXA bone densitometry is simple, non-invasive procedure. Once on the table you may be asked to hold an awkward position for a short time while the arm of the machine passes over your body taking measurements. It is important that you stay as still as possible during the procedure to ensure a clear, useful image. No anesthesia is required. The procedure is painless and radiation exposure is minimal.

Who interprets the results and how do I get them?

The results of a DEXA bone density exam are interpreted by a physician, who is a specially trained and certified. Your test results will be in the form of two scores:

T score — This number shows the amount of bone you have compared with a young adult of the same gender with peak bone mass. A score above -1 is considered normal. A score between -1 and -2.5 is classified as Osteopenia, the first stage of bone loss. A score below -2.5 is defined as osteoporosis. It is used to estimate your risk of developing a fracture.

Z score — This number reflects the amount of bone you have compared with other people in your age group and of the same size and gender. If it is unusually high or low, it may indicate a need for further medical tests.

What are the benefits vs. risks?

Benefits

DEXA bone density testing is the most accurate method available for the diagnosis of osteoporosis. It is also considered an accurate estimator of fracture risk. It will not tell whether you will or will not have a fracture, but gives relative risk of suffering a fracture, just as cholesterol and blood pressure help determine risk for heart disease. A low reading should not cause you to be anxious but may help you set healthy goals. As with other diseases and conditions, early detection is the key to prevention of further bone loss and eventual fractures. DEXA equipment is widely available making DEXA bone density testing convenient for patients and doctors alike.

Risks

No complications are expected with the DEXA procedure.

What are the limitations of DEXA Bone Densitometry?

Despite its effectiveness as a method of measuring bone density DEXA is of limited use in people with a spinal deformity or those who have had previous spinal surgery. The presence of compression fractures in the spine and osteoarthritis may interfere with the accuracy of the test. CT scans may be more useful in such instances. DEXA cannot predict who will experience a fracture but can provide indications of relative risk.

Central DEXA devices are more sensitive than pDEXA devices but they are also somewhat more expensive. The peripheral devices don't accurately follow changes in your bones during therapy. A test done on a peripheral location, such as your heel or wrist, may help predict the risk of fracture in your spine or hip. But because bone mass tends to vary from one location to the other, measuring the heel is not as accurate as measuring the spine or hip. Small changes may normally be observed between scans due to differences in positioning and may not be significant. As with mammograms, the examination must be done with great care to maximize accuracy.