



**National Institutes of Health
Osteoporosis and Related
Bone Diseases ~
National Resource Center**

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Bone Mass Measurement: What the Numbers Mean

What Is a Bone Density Test?

A bone mineral density (BMD) test is the best way to determine your bone health. The test can identify osteoporosis, determine your risk for fractures (broken bones), and measure your response to osteoporosis treatment. The most widely recognized BMD test is called a dual-energy x-ray absorptiometry, or DXA test. It is painless—a bit like having an x ray. The test can measure bone density at your hip and spine.

What Does the Test Do?

A DXA test measures your bone mineral density and compares it to that of an established norm or standard to give you a score. Although no bone density test is 100-percent accurate, the DXA test is the single most important predictor of whether a person will have a fracture in the future.

T-Score

Most commonly, your DXA test results are compared to the ideal or peak bone mineral density of a healthy 30-year-old adult, and you are given a T-score. A score of 0 means your BMD is equal to the norm for a healthy young adult. Differences between your BMD and that of the healthy young adult norm are measured in units called standard deviations (SDs). The more standard deviations below 0, indicated as negative numbers, the lower your BMD and the higher your risk of fracture.

As shown in the table below, a T-score between +1 and –1 is considered normal or healthy. A T-score between –1 and –2.5 indicates that you have low bone mass, although not low enough to be diagnosed with osteoporosis. A T-score of –2.5 or lower indicates that you have osteoporosis. The greater the negative number, the more severe the osteoporosis.

World Health Organization Definitions Based on Bone Density Levels	
Normal	Bone density is within 1 SD (+1 or –1) of the young adult mean.
Low bone mass	Bone density is between 1 and 2.5 SD below the young adult mean (–1 to –2.5 SD).
Osteoporosis	Bone density is 2.5 SD or more below the young adult mean (–2.5 SD or lower).
Severe (established) osteoporosis	Bone density is more than 2.5 SD below the young adult mean, and there have been one or more osteoporotic fractures.

Z-Score

Sometimes your bone mineral density is compared to that of a typical individual whose age is matched to yours. This comparison gives you a Z-score. Because a low BMD level is common among older adults, comparisons with the BMD of a typical individual whose age is matched to yours can be misleading. Therefore, the diagnosis of osteoporosis or low bone mass is based on your T-score. However, a Z-score can be useful for determining whether an underlying disease or condition is causing bone loss.

Low Bone Mass Versus Osteoporosis

The information provided by a BMD test can help your doctor decide which prevention or treatment options are right for you.

If you have low bone mass that is not low enough to be diagnosed as osteoporosis, this is sometimes referred to as osteopenia. Low bone mass can be caused by many factors such as:

- heredity
- the development of less-than-optimal peak bone mass in your youth
- a medical condition or medication to treat such a condition that negatively affects bone
- abnormally accelerated bone loss.

Although not everyone who has low bone mass will develop osteoporosis, everyone with low bone mass is at higher risk for the disease and the resulting fractures.

As a person with low bone mass, you can take steps to help slow down your bone loss and prevent osteoporosis in your future. Your doctor will want you to develop—or keep—healthy habits such as eating foods rich in calcium and vitamin D and doing weight-bearing exercise such as walking, jogging, or dancing. In some cases, your doctor may recommend medication to prevent osteoporosis.

Osteoporosis: If you are diagnosed with osteoporosis, these healthy habits will help, but your doctor will probably also recommend that you take medication. Several effective medications are available to slow or even reverse bone loss. If you do take medication to treat osteoporosis, your doctor can advise you concerning the need for future BMD tests to check your progress.

Who Should Get a Bone Density Test?

The U.S. Preventive Services Task Force recommends that women age 65 and older be screened routinely for osteoporosis. The task force also recommends that routine screening begin at age 60 for women who are at increased risk for osteoporotic fractures.

In addition, a panel convened by the National Institutes of Health in 2000 recommended that bone density testing be considered in people taking glucocorticoid medications for 2 months or more and in those with conditions that place them at high risk for an osteoporosis-related fracture.

However, the panel did not find enough scientific evidence upon which to base universal recommendations about when all women and men should obtain a BMD test. Instead, an individualized approach is recommended.

Also, various professional medical societies have established guidelines concerning when a person should get a BMD test. Many of these guidelines can be found by conducting a search in an online database established by the National Guideline Clearinghouse at www.guideline.gov.

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For Your Information

This publication contains information about medications used to treat the health condition discussed here. When this fact sheet was printed, we included the most up-to-date (accurate) information available. Occasionally, new information on medication is released.

For updates and for any questions about any medications you are taking, please contact the Food and Drug Administration at 888-INFO-FDA (888-463-6332, a toll-free call) or visit its Web site at www.fda.gov.

For updates and questions about statistics, please contact the Centers for Disease Control and Prevention's National Center for Health Statistics toll free at 800-232-4636 or visit its Web site at www.cdc.gov/nchs.

Recognizing the National Bone and Joint Decade: 2002–2011