TEST

Bone mineral density test

A bone mineral density test uses low-dose X-rays to measure bone strength and estimate fracture risk.

WHAT IT MEASURES
Mineral content packed into a measured area of bone

SAMPLE
None; low-dose X-ray imaging

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually 10 to 30 minutes

RESULTS IN
Often a few days; reporting workflow affects timing

USED FOR
Screening, diagnosis support, and monitoring

MAIN LIMITATION
Spine arthritis can make bone density look falsely high

Overview

A bone mineral density test measures how much mineral is packed into part of your bones. The standard method is dual-energy X-ray absorptiometry, abbreviated DXA. It uses a very small amount of ionizing radiation.

The test usually measures the lower spine and hips. The forearm may be measured when the hip or spine cannot be assessed reliably.

Bone density is one part of bone strength. The result helps estimate your chance of breaking a bone, but it cannot predict whether a fracture will happen. The scan is also different from an ordinary X-ray used to look for a current fracture.

Why the test is ordered

The test may be ordered to screen for osteoporosis before a fracture occurs. Osteoporosis means that bones have become less dense and more likely to break.

It may also be used after a fracture caused by relatively little force, such as a fall from standing height. This is called a fragility fracture.

Other reasons include having a condition or taking a medicine that can weaken bone. Repeat testing may monitor changes over time or the response to osteoporosis treatment.

Who should have the test

Screening recommendations differ among countries and medical organizations. In the United States, the US Preventive Services Task Force recommends screening women aged 65 and older. It also recommends screening postmenopausal women younger than 65 when an initial risk assessment shows increased fracture risk. Evidence is insufficient for the task force to recommend for or against routine screening in men.

Testing may be considered at other ages when individual risk is higher. Relevant factors include:

These factors do not mean you have osteoporosis. They help determine whether testing may be useful.

- A previous fragility fracture
- Long-term use of medicines that can weaken bone, especially corticosteroids like prednisone or hydrocortisone
- Conditions affecting hormone levels or nutrient absorption
- Low body weight or substantial height loss
- An organ transplant or some long-term inflammatory conditions
- Monitoring of diagnosed low bone density or osteoporosis

How to prepare

You can usually eat and drink normally because fasting is not required. Coffee is generally allowed.

Some imaging centres ask you not to take calcium supplements for about 24 hours before the scan. Follow your centre's instructions, but do not stop prescribed medicines unless told to do so.

Wear loose clothing without metal fasteners if possible. You may need to remove a belt, jewellery, underwired bra, keys, or other metal objects near the area being scanned.

Tell the imaging centre if you may be pregnant. Also mention any recent CT contrast study, barium examination, or nuclear medicine test. Material from these procedures can interfere with the image, so the scan may need to be scheduled later.

What happens during the test

You lie on your back on a padded, open table while the scanner passes over the area without touching you. Your legs may rest on a support for a spine measurement, or your foot may be placed in a padded holder for a hip measurement.

You need to remain still but can breathe normally. The scan is painless, and you are not enclosed in a tunnel. No injection or contrast dye is normally needed.

The appointment usually takes 10 to 30 minutes, although scanning may be shorter. You can generally return to normal activities immediately.

Understanding your results

The report gives your bone mineral density and may include a T-score, a Z-score, or both.

A T-score compares your result with the average bone density of a healthy young adult. It is commonly used for postmenopausal women and men aged 50 or older.

Widely used categories for these groups are:

A Z-score compares your result with people of a similar age and sex. It is more relevant for children, premenopausal women, and men younger than 50. Bone density alone generally should not be used to diagnose osteoporosis in these groups.

Your lowest relevant score, fracture history, age, fall risk, medicines, and other health factors affect interpretation. A previous fragility fracture can be important even when the T-score is not in the osteoporosis range.

Interpretation also varies by laboratory, age, sex, pregnancy status, medicines, and the bones measured.

- −1.0 or higher: bone density in the expected range
- Below −1.0 but above −2.5: low bone mass
- −2.5 or lower: bone density in the osteoporosis range

What affects the results

Arthritis, calcium deposits in nearby blood vessels, and collapsed spinal bones can make the lower spine appear denser than it is. Metal implants, surgical cement, or hardware may prevent accurate assessment.

Movement, hip rotation, or incorrect selection of the measured area can change the result. Bone size also matters because DXA measures mineral over an area rather than through the full depth of bone.

Numbers from different machines and manufacturers may not be directly interchangeable. Monitoring is most reliable when repeat scans use the same facility and machine with consistent positioning.

Recent barium, CT contrast, or radioactive tracer studies may interfere with imaging. Eating, coffee, time of day, and ordinary exercise usually have little meaningful effect.

Medicines and medical conditions also affect interpretation. Corticosteroids, for example, may raise fracture risk more than the density number alone suggests.

Accuracy and limitations

DXA is the standard test for measuring bone mineral density because it is quick, consistent, and uses little radiation. However, it does not directly measure bone structure or overall bone quality.

Some people have fractures despite a result outside the osteoporosis range because falls, bone quality, medicines, and health conditions also matter. Spine arthritis, old compression fractures, positioning problems, and differences between machines can make density look higher or create an apparent change that is not real.

Small differences between scans may reflect normal measurement variation. Reports may state the facility's "least significant change," meaning the smallest difference likely to represent a genuine change.

If a current fracture is suspected, an ordinary X-ray, CT scan, MRI, or vertebral fracture assessment may be more appropriate. Heel and other peripheral screening devices are not interchangeable with a central hip-and-spine DXA scan.

Risks and complications

The test is painless and uses a low dose of radiation. It does not involve a needle.

Radiation is generally avoided during pregnancy unless imaging is medically necessary. Tell the imaging centre if you are pregnant or could be pregnant.

What happens next

Your result is reviewed alongside your fracture history and other risk factors. Follow-up may include advice about physical activity, nutrition, fall prevention, or tests for conditions that affect bone.

If monitoring is needed, the timing of another scan depends on your result, age, treatment, risk factors, and how quickly a meaningful change could be detected. Repeating the test too soon may show only measurement variation.

The scan does not cause delayed emergency symptoms. Seek urgent medical care for a possible fracture, including severe pain after a fall, a visibly deformed limb, inability to stand or bear weight, or sudden severe back pain with new weakness, numbness, or loss of bladder or bowel control.

Common questions

Can I drink coffee before a bone density test?

Yes. Fasting is not normally required, so coffee and usual meals are generally allowed. Follow any different instructions from the imaging centre.

Does the time of day matter?

Usually not. Bone mineral density does not change enough during one day to affect routine interpretation.

Can I exercise beforehand?

Yes. Ordinary exercise does not meaningfully alter the result.

Should I take my calcium supplement that morning?

Many centres ask you to avoid calcium supplements for about 24 hours because an undissolved tablet could interfere with the image. Check your instructions, and do not stop prescribed medication without advice.

Can I leave my clothes on?

Often you can if your clothing has no metal near the hips or spine. Otherwise, you may need to wear a gown.

How often will I need another scan?

There is no single interval. Timing depends on your result, treatment, age, fracture risk, and whether enough time has passed to detect a genuine change.

Sources

- International Society for Clinical Densitometry: 2023 Official Adult Positions
- US Preventive Services Task Force: Osteoporosis to Prevent Fractures-Screening, 2025
- Radiological Society of North America and American College of Radiology: Bone Density Scan
- Bone Health and Osteoporosis Foundation: Bone Density Test, Osteoporosis International
- LeBoff MS, Greenspan SL, Insogna KL, et al. The clinician's guide to prevention and treatment of osteoporosis. Osteoporosis International. 2022;33:2049-2102