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**Osteoporosis:**

Osteoporosis happens when bone density decreases and the body stops producing as much bone as it did before.

It can affect both males and females, but it is most likely to occur in women after [menopause](https://www.medicalnewstoday.com/articles/155651.php), because of the sudden decrease in [estrogen](https://www.medicalnewstoday.com/articles/277177.php), the hormone that normally protects against osteoporosis.

As the bones become weaker, there is a higher risk of a [fracture](https://www.medicalnewstoday.com/articles/173312.php) during a fall or even a fairly minor knock.

**Fast facts on osteoporosis:**

* Osteoporosis affects the structure and strength of bones and makes fractures more likely, especially in the spine, hip, and wrists.
* It is most common among females after menopause, but smoking and poor diet increase the risk.
* There are often no clear outward symptoms, but weakening of the spine may lead to a stoop, and there may be bone pain.
* A special x-ray-based scan, known as DEXA, is used for diagnosis.
* Treatments include drugs to prevent or slow bone loss, exercise, and dietary adjustments, including extra [calcium](https://www.medicalnewstoday.com/articles/248958.php), [magnesium](https://www.medicalnewstoday.com/articles/286839.php) and [vitamin D](https://www.medicalnewstoday.com/articles/161618.php).

**What is osteoporosis?**

"Osteoporosis" literally means "porous bones." The bones become weaker, increasing the risk of fractures, especially in the hip, spinal vertebrae, and wrist. Bone tissue is constantly being renewed, and new bone replaces old, damaged bone. In this way, the body maintains bone density and the integrity of its crystals and structure.

Bone density peaks when a person is in their late 20s. After the age of around 35 years, bone starts to become weaker. As we age, bone breaks down faster than it builds. If this happens excessively, osteoporosis results.

**Causes and risk factors:**

A number of risk factors for osteoporosis have been identified. Some are modifiable, but others cannot be avoided.

**Unavoidable factors:**

Non-modifiable risk factors [include](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoporosis.asp):

* Age: Risk increases after the mid-30s, and especially after menopause.
* Reduced sex hormones: Lower estrogen levels appear to make it harder for bone to reproduce.
* Ethnicity: White people and Asians are more susceptible than other ethnic groups.
* Bone structure: Being tall (over 5 feet 7 inches) or slim (weighing under 125 pounds) increases the risk.
* Genetic factors: Having a close family member with a diagnosis of hip fracture or osteoporosis makes osteoporosis more likely.
* Fracture history: Someone who has previously experienced a fracture during a low-level injury, especially after the age of 50 years, is more likely to receive a diagnosis.

**Diet and lifestyle choices:**

Modifiable risk factors [include](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoporosis.asp):

* eating disorders, such as [anorexia](https://www.medicalnewstoday.com/articles/267432.php) or [bulimia](https://www.medicalnewstoday.com/articles/105102.php) nervosa, or orthorexia
* tobacco smoking
* excessive alcohol intake
* low levels or intake of calcium, magnesium, and [vitamin](https://www.medicalnewstoday.com/articles/195878.php) D, due to dietary factors, malabsorption problems, or the use of some medications
* inactivity or immobility

Weight-bearing exercise helps prevent osteoporosis. It places [stress](https://www.medicalnewstoday.com/articles/145855.php) on the bones, and this encourages bone growth.

**Drugs and health conditions:**

Some diseases or medications cause changes in hormone levels, and some drugs reduce bone mass.

Diseases that affect hormone levels include [hyperthyroidism](https://www.medicalnewstoday.com/articles/9153.php), hyperparathyroidism, and Cushing's disease.

Research published in 2015 [suggests](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5226129/) that transgender women who receive hormone treatment (HT) may be at higher risk of osteoporosis. However, using anti-androgens for a year before starting HT may reduce this risk. Transgender men do not appear to have a high risk of osteoporosis. More research is needed to confirm this.

Conditions that increase the risk [include](http://www.msdmanuals.com/en-gb/professional/musculoskeletal-and-connective-tissue-disorders/osteoporosis/osteoporosis):

* [cancer](https://www.medicalnewstoday.com/info/cancer-oncology/)
* COPD
* chronic [kidney disease](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoporosis.asp)
* some autoimmune diseases, such as [rheumatoid arthritis](https://www.medicalnewstoday.com/info/rheumatoid-arthritis/) and [ankylosing spondylitis](https://www.medicalnewstoday.com/articles/248217.php)

Medications that raise the risk [include](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoporosis.asp):

* glucocorticoids and corticosteroids, including prednisone and prednisolone
* thyroid hormone
* anticoagulants and blood-thinners, including heparin and warfarin
* protein-pump inhibitors (PPIs) and other antacids that adversely affect mineral status
* some [antidepressant](https://www.medicalnewstoday.com/kc/antidepressants-work-248320) medications
* some vitamin A (retinoid) medications
* [thiazide diuretics](https://www.uptodate.com/contents/drugs-that-affect-bone-metabolism)
* thiazolidinedione, used to treat [type 2 diabetes](https://www.medicalnewstoday.com/info/diabetes/type2diabetes.php), as these decrease bone formation
* some immunosuppressant agents, such as cyclosporine, which increase both bone resorption and formation
* aromatase inhibitors and other treatments that deplete sex hormones, such as anastrozole, or Arimidex
* some chemotherapeutic agents, including letrozole (Femara), used to treat [breast cancer](https://www.medicalnewstoday.com/articles/37136.php), and leuprorelin (Lupron) for [prostate cancer](https://www.medicalnewstoday.com/articles/150086.php) and other conditions

Glucocorticoid-induced osteoporosis is the most common type of drug-induced osteoporosis.

**Signs and symptoms:**

Bone loss that leads to osteoporosis [develops slowly](http://www.aafp.org/afp/2009/0201/p201.html). There are often no symptoms or outward signs, and a person may not know they have it until they experience a fracture after a minor incident, such as a fall, or even a cough or sneeze.

Commonly affected areas are the hip, a wrist, or spinal vertebrae.

**Tests and diagnosis:**

A doctor will consider the patient's family history and their risk factors. If they suspect osteoporosis, they will request a scan, to measure bone mineral density (BMD).

Bone density scanning [uses a type of x-ray](http://www.radiologyinfo.org/en/info.cfm?pg=dexa)technology known as dual-energy X-ray absorptiometry (DEXA) and bone densitometry.

Combined with the patient's risk factors, DEXA can indicate the likelihood of fractures occurring due to osteoporosis. It can also help monitor response to treatment.

Two types of device can carry out a DEXA scan:

* A central device: A hospital-based scan measures hip and spine bone mineral density while the patient lies on a table.
* A peripheral device: A mobile machine that tests bone in the wrist, heel, or finger.

**DEXA test results:**

The results of the test are given as a DEXA T-score or a Z-score.

The T-score [compares](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoporosis.asp) the patient's bone mass with peak bone mass of a younger person.

* -1.0 or above is normal
* from -1.0 to -2.5 suggests mild bone loss
* -2.5 or below indicates osteoporosis

The Z-score compares the patient's bone mass with that of other people with similar build and age.

The test is normally repeated every 2 years, as this allows for comparison between results.

**Other tests:**

A lateral vertebral assessment (LVA) [may be recommended](https://www.radiologyinfo.org/en/info.cfm?pg=dexa) for an older patient who is more than one inch shorter than they used to be, or who has [back pain](https://www.medicalnewstoday.com/articles/172943.php) that is not related to another condition.

An [ultrasound](https://www.medicalnewstoday.com/articles/245491.php) scan of the heel bone is [another way](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3880487/) to assess for osteoporosis. It can be carried out in the primary care setting. It is less common than DEXA, and the measurements cannot be compared against DEXA T-scores. Breaks in the spine can lead to changes in posture, a stoop, and curvature of the spine.

**Treatment and prevention:**

Treatment aims to:

* slow or prevent the development of osteoporosis
* maintain healthy bone mineral density and bone mass
* prevent fractures
* reduce pain
* maximize the person's ability to continue with their daily life

This is done through preventive lifestyle measure and the use of supplements and some drugs.

**Calcium and vitamin D**

**Calcium** is essential for bones, and ensuring an adequate calcium intake is important.

Adults aged 19 years and above should consume 1,000 milligrams (mg) a day. Women aged 51 years and over, and all adults from 71 years should have a daily intake of 1,200 mg.

Dietary sources are preferable and [include](https://ods.od.nih.gov/pdf/factsheets/Calcium-Consumer.pdf):

* dairy produce, such as milk, cheese, and yogurt
* green leafy vegetables, such as [kale](https://www.medicalnewstoday.com/articles/270435.php) and broccoli
* fish with soft bones, such as tinned salmon and tuna
* fortified breakfast cereals

If a person's dietary intake is not enough, supplements are an option.

**Vitamin D** plays a key role, as it helps the body absorb calcium. Dietary sources include fortified foods, saltwater fish, and liver.

However, most vitamin D does not come from food but from sun exposure, so moderate, regular exposure to sunlight is recommended.

**Lifestyle factors for preventing osteoporosis:**

Other ways to minimize the risk are:

* not smoking, as this can reduce the growth of new bone and decrease estrogen levels in women
* limiting alcohol intake, to encourage healthy bones and prevent falls
* getting regular weight-bearing exercise, such as walking, as this promotes healthy bone and strengthens support from muscles
* doing exercises to promote flexibility and balance, such as [yoga](https://www.medicalnewstoday.com/articles/286745.php), as these can reduce the risk of falls and fractures

For people who already have osteoporosis, [nutrition](https://www.medicalnewstoday.com/articles/160774.php), exercise and fall prevention [play a key role](http://www.niams.nih.gov/Health_Info/Bone/Osteoporosis/) in reducing risks and bone loss.

**Drug therapy:**

Drugs that can [help prevent](http://www.niams.nih.gov/Health_Info/Bone/Osteoporosis/) and treat osteoporosis include:

* Bisphosphonates: These are antiresorptive drugs that slow bone loss and reduce fracture risk.
* Estrogen agonists or antagonists, also known as selective estrogen-receptor modulators, SERMS), for example, raloxifene (Evista): These can reduce the risk of spine fractures in women after menopause.
* Calcitonin (Calcimar, Miacalcin): This helps prevent spinal fracture in postmenopausal women, and it can help manage pain if a fracture occurs.
* Parathyroid hormone, for example, teriparatide (Forteo): This is approved for people with a high risk of fracture, as it stimulates bone formation.
* RANK ligand (RANKL) inhibitors, such as denosumab (Xgeva): This is an immune therapy and a new type of osteoporosis treatment.

Other types of estrogen and hormone therapy may help.

**The future of osteoporosis therapy?**

In future, treatment may include [stem cell](https://www.medicalnewstoday.com/info/stem_cell/) therapy. In 2016, researchers [found that](https://www.ncbi.nlm.nih.gov/pubmed/26987353) injecting a particular kind of stem cell into mice reversed osteoporosis and bone loss in a way that could, potentially, benefit humans too.

Findings published in 2015 suggested that growth hormone (GH) taken with calcium and vitamin D supplements [could reduce](http://press.endocrine.org/doi/10.1210/jc.2015-1757) the risk of fractures in the long term.

Also in 2015, researchers in the United Kingdom (U.K.) found [evidence](http://www.medicalnewstoday.com/articles/301872.php) that a diet containing soy protein and isoflavones may offer protection from bone loss and osteoporosis during menopause.

Scientists believe that up to 75 percent of a person's bone mineral density is determined by genetic factors. Researchers are investigating which genes are responsible for bone formation and loss, in the hope that this might offer new ways of preventing osteoporosis in future.

**Complications:**

As bones become weaker, fractures occur more frequently, and, with age, they take longer to heal.

This can lead to ongoing pain and loss of stature, as bones in the spine begin to collapse. A broken hip can be hard to recover from, and the person may no longer be able to live independently.

It is important to take action to prevent falls among people with osteoporosis.

Tips [include](https://www.cdc.gov/features/falls-prevention-day/index.html):

* removing trip hazards, such as throw rugs and clutter
* having regular vision screenings and keeping eyewear up to date
* installing grab bars, for example, in the bathroom
* ensuring there is plenty of light in the home
* practicing exercise that helps with balance, such as tai chi
* asking the doctor to review medications, to reduce the risk of dizziness

The United States Preventive Services Task Force (USPSTF) [recommend](https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/osteoporosis-screening%20) screening for all women aged 65 years and over, and younger women who are at high risk of experiencing a fracture.

Anyone who is concerned that they may be at risk of osteoporosis should ask their doctor about screening.