

## DEXA scan

### Introduction

A DEXA scan involves lying on an X-ray table so that the affected area of the body can be scanned

### DEXA scans

There are two types of DEXA scan that are described below.

**Axial or central DEXA scan** – a large scanning arm is passed over the body to measure bone density in the centre of the skeleton, such as in the hip and lower spine.

**Peripheral DEXA scan (pDEXA)** – a large scanning arm or smaller portable device is used to measure bone density in the outer regions of the skeleton, such as the wrist, heel or hand.

Central DEXA devices are more commonly used to diagnose osteoporosis. Peripheral devices have the advantage of being small and portable.

A DEXA scan is a special type of X-ray that measures bone density. DEXA stands for dual energy X-ray absorptiometry.

DEXA scans, also known as DXA scans, bone density scans or bone densitometry scans are most commonly used to diagnose osteoporosis (where the bones become weak and fragile and more likely to break). They can also be used to assess the risk of osteoporosis developing.

A DEXA bone scan can also help detect other bone-related conditions, such as osteopenia (very low bone mineral density) and osteomalacia (softening of the bones caused by a vitamin D deficiency). In children, osteomalacia is known as rickets.

### Osteoporosis

You may need to have a DEXA scan if you are at risk of developing osteoporosis.

Osteoporosis can affect people of both sexes and all ages, although older, post-menopausal women are particularly at risk. This is because after the menopause the level of the hormone oestrogen falls, resulting in a decrease in bone density.

The denser your bones, the stronger and less likely they are to fracture (break). Osteoporosis does not cause any symptoms until a bone is broken.

In the past it was difficult to measure bone density and identify those at risk of developing osteoporosis, until a fracture occurred.

However, by using bone densitometry techniques, such as bone density scans, it is now possible to measure bone density before fractures occur.

### Measuring bone density

During a DEXA scan, X-rays will be passed through your body. Some radiation will be absorbed by the bone and soft tissue, and some will travel through your body.

Special detectors in the DEXA scanner measure how much radiation passes through your bones and this information is sent to a computer.

The measurements will be compared to the normal range for bone density in a healthy adult and someone of the same gender and ethnicity.

### Safety

A DEXA scan is a quick and painless bone scan and is more effective than a normal X-ray in identifying low bone density. It also uses a much lower level of radiation than a standard X-ray.

A DEXA scan uses the equivalent of less than 10% of one day's exposure to natural background radiation. By comparison, a chest X-ray uses the equivalent of about five days' exposure to natural background radiation.

Despite being very safe procedures, DEXA scans and X-rays are not recommended for women who are pregnant. X-rays are not considered to be safe to use during pregnancy because they can cause damage to an unborn child.

## When a DEXA scan is used

A DEXA scan is used to measure bone density and assess the risk of bone fractures. It is often used to help diagnose osteoporosis and other similar bone conditions, including osteopenia and osteomalacia.

DEXA scans can also be used to measure body composition (the amount of bone, fat and muscle in the body).

## Identifying bone conditions

Unlike ordinary X-rays, DEXA scans can measure very small changes in bone mineral density, making it possible to diagnose osteoporosis (weak and brittle bones) in its early stages before fractures occur.

A DEXA scan also uses a low dose of radiation, which means that the risks to health are lower than with X-rays.

DEXA scans can also help identify other conditions that affect bone density, such as osteopenia, where bone density is lower than average but not low enough to be classed as osteoporosis, and osteomalacia, where the bones are softened due to a vitamin D deficiency.

The results of a DEXA scan are used by doctors to help them decide whether treatment for low bone density is needed. For example, if you are diagnosed with osteopenia, lifestyle changes may be recommended to improve your bone health. These might include:

eating a healthy, balanced diet that is high in calcium

spending more time in the sun to help increase your levels of vitamin D

regularly doing weight-bearing exercise, such as walking or running

## When a DEXA scan is recommended

A DEXA scan may be recommended if you have an increased risk of developing a bone condition such as osteoporosis. Your risk is increased if you:

have had a fracture after a minor fall or injury

are a woman who has experienced an early menopause, or you have had your ovaries removed at a young age (below 45) and have not had hormone replacement therapy (HRT)

are a post-menopausal woman and you smoke or drink heavily, have a family history of hip fractures, or you have a body mass index (BMI) of less than 21

are a man or a woman with a condition that leads to low bone density, such as rheumatoid arthritis (pain and swelling in the joints)

are a woman who has large gaps between periods (more than a year)

are a man or a woman who is taking oral glucocorticoids for three months or more (glucocorticoids help treat inflammation but can also cause weakened bones)

## Limitations

A DEXA scan is not the only way of measuring bone strength or fragility.

Other risk factors need to be taken into account, such as family history and medication use, to determine who is at risk of developing bone fractures. All of the risk factors will need to be considered before a DEXA scan is recommended and before any treatment is started.

Some people will need to have a DEXA scan to confirm that their risk of developing bone fractures is high enough to need treatment. For other people, particularly the elderly, the risk of fracture may be so high that there is no need for them to have a DEXA scan before treatment is prescribed.

It can be difficult to interpret the results of a DEXA scan, particularly of the spine, when someone has a degenerative condition, such as osteoarthritis. In such cases, spinal abnormalities or a previous spinal fracture can give a false result.

## How a DEXA scan is performed

## The FRAX tool

The World Health Organization (WHO) has developed a fracture risk assessment tool (FRAX) to help predict a person's risk of fracture.

The tool is based on bone mineral density (BMD) and other relevant risk factors such as age and sex.

The FRAX algorithms give a 10-year probability of hip fracture and a 10-year probability of major fracture in the spine, shoulder and forearm.

You can download the FRAX tool, which is available in both paper and computer format.

A DEXA scan is a quick and painless procedure that involves lying on your back on an X-ray table so that an area of your body can be scanned.

No preparations are needed before you have a DEXA scan. Depending on the part of your body being scanned, you may be able to remain fully clothed. However, you will need to remove any clothes that have metal fastenings. In some cases, it may be necessary for you to wear a gown.

### Having a DEXA scan

Unlike a magnetic resonance imaging (MRI) scan, a DEXA scan does not involve being enclosed inside a tunnel, so you will not feel claustrophobic.

Instead, you lie on your back on a flat X-ray table. You will need to keep very still during the scan so that the images produced are not blurred.

The scan will usually be carried out by a radiographer (a specialist in taking X-ray images). As the scanning arm is slowly moved over your body, a narrow beam of low-dose X-rays will be passed through the part of your body being examined.

This will usually be your hip and lower spine to check for osteoporosis (weak and brittle bones). However, as bone density varies in different parts of the skeleton, more than one part of your body may be scanned.

Some of the X-rays that are passed through your body will be absorbed by tissue, such as fat and bone. An X-ray detector contained in the scanning arm will measure the amount of X-rays that have passed through your body. This information will then be used to produce an image of the scanned area.

A DEXA scan usually takes five minutes or less, depending on the area of your body being examined and whether you are having a central or peripheral scan (see DEXA scans).

During a peripheral scan, a small, portable device will be used to scan an area of your body such as your forearm, heel or hand. You will be able to go home immediately after having a scan.

## Your results

A DEXA scan compares your bone density with the bone density of a young healthy adult or an adult of your own age, gender and ethnicity.

The difference is then calculated as a standard deviation (SD), which is a measure of variability based on an average or expected value.

The difference between your measurement and that of a young healthy adult is known as a T score, and the difference between your measurement and that of someone of the same age is known as a Z score.

The World Health Organization (WHO) classifies T scores as follows:

above -1 SD is normal

between -1 and -2.5 SD is classed as osteopenia

below -2.5 SD is classed as osteoporosis

If your Z score is below -2, your bone density is lower than it should be for someone your age.

Although bone mineral density (BMD) readings provide a good indication of bone strength, the results of a DEXA scan will not necessarily predict whether a fracture is likely to occur.

For example, someone with low bone density may never break a bone, whereas someone with average bone density may have several fractures. This is because other factors, such as age, sex or previously having had a fall, will also determine your susceptibility to experiencing a fracture.

Therefore, your doctor will consider all of your individual risk factors before deciding whether treatment is necessary.