



Osteoporosis

This booklet provides information and answers to your questions about this condition and its treatment.

What is osteoporosis?



Osteoporosis is a condition that causes the bones to become thin, so they break more easily. In this booklet we'll explain what causes osteoporosis and how it's treated. We'll also look at what you can do to reduce your risk of developing osteoporosis and suggest where you can find out more.

At the back of this booklet you'll find a brief glossary of medical words – we've underlined these when they're first used.

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Osteoporosis is a condition which makes the bones fragile. There are usually no symptoms, and it's often only discovered when you break a bone in a minor accident or fall.

At a glance

Osteoporosis

What is osteoporosis?

Bone is a living tissue, but as we get older it's not able to renew itself as well and our bones start to thin. This happens to everybody to some degree, but when the bones become fragile it's called osteoporosis.

Who gets it?

Osteoporosis is common in the UK. Although it's more common in women, particularly after the menopause, it's not uncommon in men. You're at greater risk of developing osteoporosis if you:

- have needed steroid treatment for more than three months
- have a family history of osteoporosis
- don't do much weight-bearing exercise
- are a heavy drinker or smoker.

If you're female, your risk may also be increased if you've:

- been through the menopause, especially if it was early (before the age of 45)
- had your ovaries removed.

If you develop osteoporosis, there are a number of treatments that can help.

How can I help myself?

The following will help to reduce your risk of developing osteoporosis:

- Get plenty of calcium and vitamin D as part of a well balanced diet.
- Exercise regularly, especially activities that involve walking or running.
- Stop smoking.
- Don't drink too much alcohol.

What treatments are there?

There are a number of treatments available, including:

- calcium and vitamin D
- bisphosphonates (for example alendronate, risedronate)
- teriparatide
- raloxifene
- denosumab
- strontium ranelate.

What is osteoporosis?

The word osteoporosis means spongy (porous) bone. Bone is made up of minerals, mainly calcium salts, bound together by strong collagen fibres. Our bones have a thick, hard outer shell (called cortical or compact bone) which is easily seen on x-rays. Inside this, there's a softer mesh of bone (trabecular bone) which has a honeycomb-like structure.

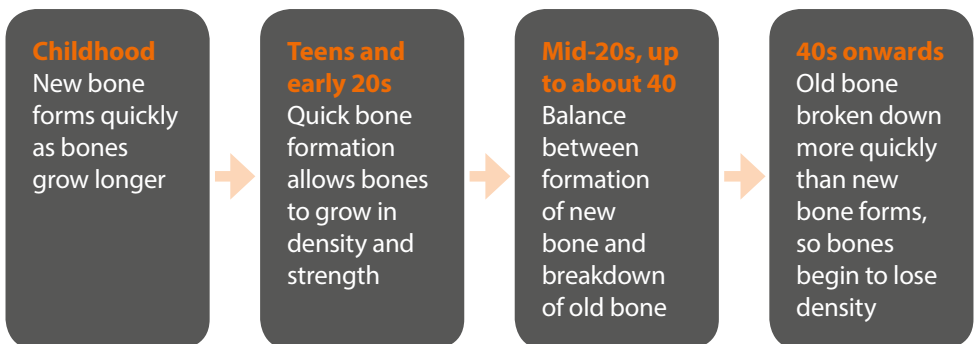
Bone is a living, active tissue that's constantly renewing itself. Old bone tissue is broken down by cells called osteoclasts and is replaced by new bone material produced by cells called osteoblasts.

The balance between the breakdown of old bone and the formation of new bone changes at different stages of our lives (see Figure 1).

1. In childhood and adolescence, new bone is formed very quickly. This allows our bones to grow bigger and stronger (denser). Bone density reaches its peak by our mid to late-20s.
2. After this, new bone is produced at about the same rate as older bone is broken down. This means that the adult skeleton is completely renewed over a period of 7–10 years.
3. Eventually, from the age of about 40, bone starts to be broken down more quickly than it's replaced, so our bones slowly begin to lose their density.

Everybody will have some degree of bone loss as they get older, but the term osteoporosis is used only when the bones become quite fragile. When bone is affected by osteoporosis, the holes in the honeycomb structure become larger and the overall density is lower – which is why the bone is more likely to break (fracture) (see Figure 2).

Figure 1 Stages of bone development and renewal



What are the symptoms of osteoporosis?

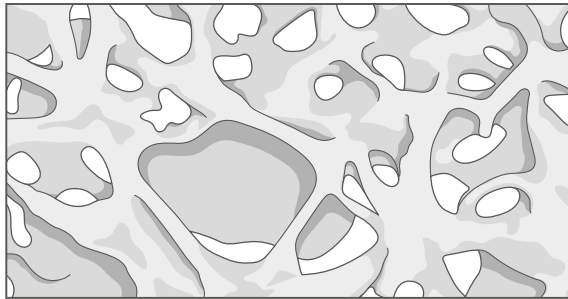
Quite often the first sign of osteoporosis is breaking a bone in a minor fall or accident. Fractures are most likely to happen at the hip, spine or wrist.

! Each year in the UK there are around 70,000 hip, 120,000 spine and 50,000 wrist fractures linked to osteoporosis.

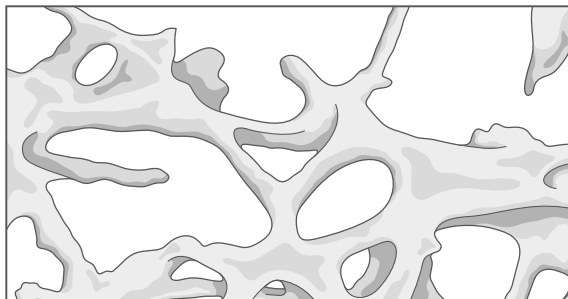
Spinal problems occur if the bones in your spine (vertebrae) become weak and lose height (described as a vertebral crush

fracture). This usually happens around the middle/lower back. If several vertebrae are affected, your spine will start to curve and you may become shorter. This can sometimes cause back pain and some people may have difficulty breathing simply because there's less space under their ribs.

People who have spinal fractures will also have a greater risk of hip and wrist fractures. Spinal fractures can even occur without any injury.



Normal bone



Bone affected by osteoporosis

Figure 2
The effect of
osteoporosis
on bone

Who gets osteoporosis?

Osteoporosis is common in the UK, and the risk of developing it increases with age. Anyone can get osteoporosis but women are about four times more likely than men to develop it. There are two main reasons for this:

1. The process of bone loss speeds up for several years after the menopause, when the ovaries stop producing the female sex hormone oestrogen.
2. Men generally reach a higher level of bone density before the process of bone loss begins (see Figure 3). Bone loss still occurs in men but it has to be more severe before osteoporosis occurs.

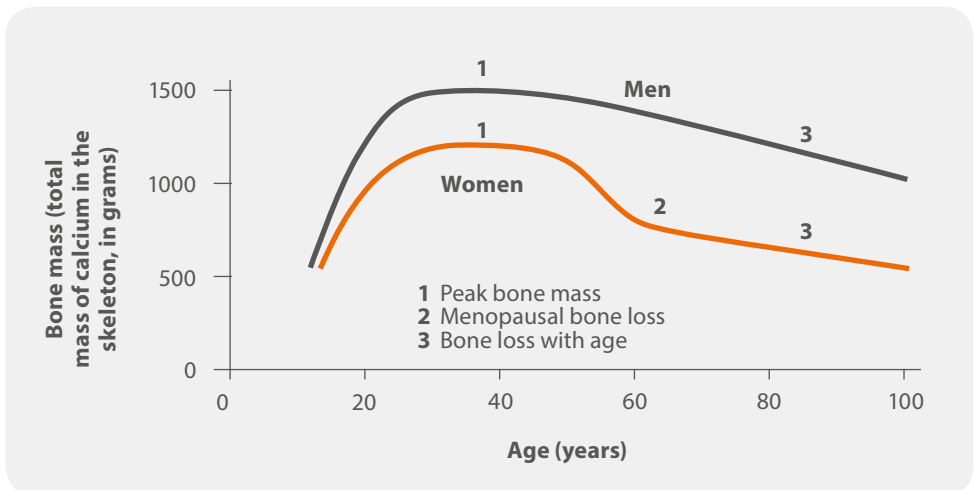
A number of other risk factors can increase your chances of developing osteoporosis.

Risk factors

Steroids (especially if taken by mouth) – Steroids (corticosteroids) are drugs which are used for a range of inflammatory conditions, for example rheumatoid arthritis. They can affect bone production by reducing the amount of calcium absorbed from the gut and increasing calcium loss through the kidneys. If you're likely to need steroids, such as prednisolone, for more than three months, your doctor will probably recommend calcium and vitamin D tablets and possibly other treatments to help protect against osteoporosis.

i See Arthritis Research UK drug leaflet *Steroid tablets*.

Figure 3 Graph showing typical total bone mass in men and women



A lack of oestrogen in the body (oestrogen deficiency) – If you have an early menopause (before the age of 45) or a hysterectomy where one or both ovaries are removed, this increases your risk of developing osteoporosis. This is because they cause your body's oestrogen production to reduce dramatically, so the process of bone loss will speed up. Removal of the ovaries only (ovariectomy or oophorectomy) is quite rare but is also linked with an increased risk of osteoporosis.

Lack of weight-bearing exercise – Exercise encourages bone development, and lack of exercise means you'll be more at risk of losing calcium from your bones and so more likely to be diagnosed with osteoporosis. The only exception to this is that women who exercise so much that their periods stop will have a higher risk of developing osteoporosis because of a lack of oestrogen. Muscle and bone health have been shown to be linked so keeping up your muscle strength with exercise is important. This will also reduce the risk of falling.

Poor diet – If your diet doesn't include enough calcium or vitamin D, you're at greater risk of osteoporosis (see section 'Diet and nutrition').

Heavy smoking – Tobacco is directly toxic to bones, and smoking reduces the cells' ability to make bone. It also lowers the oestrogen level in women and may cause early menopause. In men, smoking lowers testosterone activity, which can also weaken the bones.

Heavy alcohol consumption – Drinking a lot of alcohol reduces your body's ability to make bone. It also increases your risk of breaking a bone as a result of a fall.



Family history – Osteoporosis does run in families, probably because there are inherited factors that affect bone development. If a close relative has suffered a fracture linked to osteoporosis then your own risk of a fracture is likely to be greater than normal. It's not yet known if there's a particular genetic defect that causes osteoporosis, although we do know that people with a very rare genetic disorder called osteogenesis imperfecta are more likely to suffer fractures.

Other factors that affect your risk include:

- ethnicity
- low body weight
- previous fractures
- medical conditions such as coeliac disease (or sometimes treatments) which affect absorption of food.

Calcium and vitamin D are important in building and maintaining bone strength.

How is osteoporosis diagnosed?

There are no clear physical signs of osteoporosis, and it may not cause any problems straight away. If your doctor thinks you may have osteoporosis, they may suggest you have a DEXA (dual-energy x-ray absorptiometry) scan to measure the density of your bones. The scan is readily available and involves lying on a couch, fully clothed, for about 15 minutes while your bones are x-rayed (see Figure 4). The dose of x-rays is very small – about the same as spending a day out in the sun. The possible results are:

Normal – Your risk of a low-impact fracture is likely to be low.

Osteopenia – Your bone is weaker but your risk of a low-impact fracture is relatively small. You may or may not need treatment depending on what other risk factors you have. You should discuss with your doctor how you can reduce your risk (see 'Self-help and daily living').

Osteoporosis – You have a greater risk of low-impact fractures and you may need treatment – discuss this with your doctor.

Who should have a scan?

There's no good evidence that screening everybody for osteoporosis would be helpful. However, you should speak with your doctor about having a scan if:

- you've already had a low-impact fracture
- you need steroid treatments for three months or more

- you had an early menopause (before the age of 45)
- either of your parents has had a hip fracture
- you have another disease which can affect the bones – for example, coeliac disease, inflammatory bowel disease (Crohn's disease or ulcerative colitis), rheumatoid arthritis, diabetes and hyperthyroidism (overactive thyroid)
- your body mass index (BMI) is less than 19.

Working out your body mass index:

1. Multiply your height in metres (m) by itself.

2. Divide your weight in kilograms (kg) by the number you got in stage 1. The result is your BMI.

For example:

$$1.7 \text{ (m)} \times 1.7 = 2.89$$

$$53 \text{ (kg)} \div 2.89 = 18.3$$

Your BMI is 18.3.

For most people a healthy BMI is in the range 19–25.

Your doctor may use an online scoring tool called FRAX[®], developed by the World Health Organization (WHO), to assess your risk of fracture and to help decide whether you should have a DEXA scan or treatment for osteoporosis.

Your doctor can ask for a bone density (DEXA) scan to be carried out to test the strength of the bones.

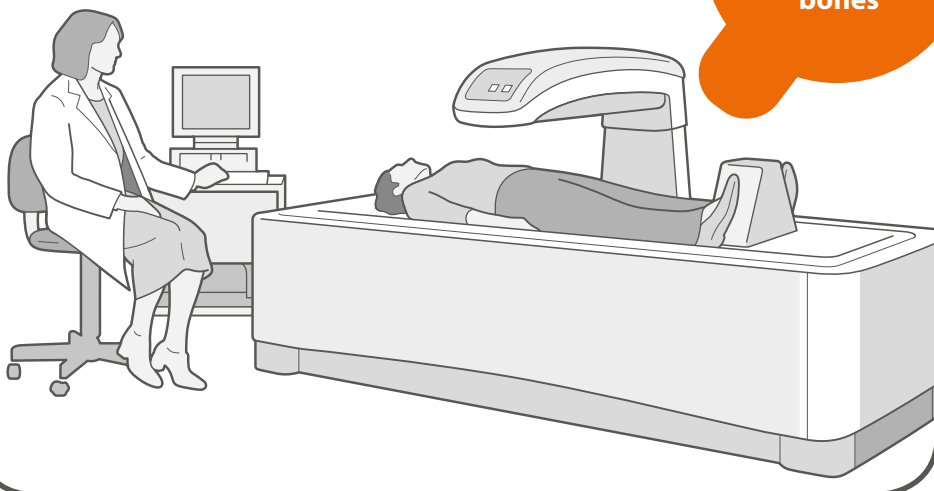


Figure 4
Testing the density of bones

What treatments are there for osteoporosis?

If you're diagnosed with osteoporosis following a low-impact fracture, the fracture will need to be treated first. The next step is to begin treatment to reduce the risk of further fractures.

Treatment of fractures

Most fractures are first treated in A&E, and you'll usually have a follow-up appointment at a fracture clinic to see how things are going.

Unless you have a vertebral compression fracture, the fractured area will usually be put in a cast for several weeks so you can't move it to allow the fracture to heal. In some cases the fracture may need manipulation by a specialist before this is done. This may be carried out in A&E, but you may need to be admitted to hospital. You're also likely to be admitted if the fracture needs surgical fixing.

It's likely that you'll also need pain relief medications, for example:

- painkillers (analgesics) such as paracetamol, codeine and occasionally morphine
- non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen or naproxen.

i See **Arthritis Research UK drug leaflets** *Painkillers and NSAIDs*.

Prevention of fractures

Self-help measures such as diet and weight-bearing exercise can help to reduce the risk of fractures, but a number of specific treatments are also available.

You're likely to have a bone density scan before you start treatment, although this may not be needed, for example, if you're 75 or over. Once you've started treatment your bone density may be monitored in one of the following ways:

- bone density scans, usually of the spine and/or hips, every 2–5 years depending on your individual circumstances



- blood and urine tests to show how well your bone is renewing itself – these aren't so widely available as bone density scans.

If you're taking hormone replacement therapy (HRT), you'll also have regular blood pressure checks and breast scans (mammograms).

Your bone density should start to improve after 6–12 months, although you may need longer-term treatment to further reduce your fracture risk.

- ❗ **Bone renewal is a slow process so it's important to continue treatment as your doctor advises – even though you won't be able to feel whether it's working.**

Because longer-term treatment can sometimes have side-effects your doctor may suggest a break from your treatment after 3–5 years. The benefits of osteoporosis treatment last a long time so these won't be lost if your doctor does suggest a 'treatment holiday'.

Calcium and vitamin D

It's recommended that you try to get enough calcium from your diet without using supplements. However, combined calcium and vitamin D supplements are often given alongside other osteoporosis treatments, especially if you struggle to get enough from other sources. Vitamin D is needed for the body to absorb and process calcium.

If you're a woman over 70 and take a calcium-only supplement, don't have more than the recommended daily intake,

as there have been concerns that this may affect heart health. This seems to apply only to supplements and not calcium from food.

Bisphosphonates

Bisphosphonates are a group of drugs that work by slowing bone loss; in many people, an increase in bone density can be measured over five years of treatment. They reduce the risk of hip and spine fractures. Bisphosphonates can be taken by mouth (orally) or through a drip (intravenous infusion) or injection.

Oral treatment

Oral bisphosphonates tend to be poorly absorbed by the body and can cause irritation of the gullet (heartburn), so it's very important that you carefully follow the instructions for taking your medication:

- Take it on an empty stomach with a glass or two of plain tap water. Other drinks may prevent the drug being properly absorbed by the body.
- You shouldn't eat anything or drink anything other than tap water, or take any other medication or supplements for at least 30 minutes afterwards (45 minutes for Bonviva). This is to help ensure the medication is effectively absorbed.
- You'll need to stay upright (sitting, standing or walking) for up to an hour afterwards to prevent the medication flowing back from your stomach and causing heartburn. You shouldn't lie down before you've eaten.

Table 1 Summary of osteoporosis treatments

Drug (brand name)	How taken	How often
Bisphosphonates		
Alendronate (Fosamax)	By mouth	Daily or weekly
Risedronate (Actonel)	By mouth	Daily or weekly
Ibandronate (Bonviva)	By mouth	Monthly
	By injection into the vein	Every 3 months
Etidronate (Didronel)	By mouth	For 2 weeks every 3 months
Pamidronate (Aredia)	By injection into the vein	Every 3 months
Zoledronate (Aclasta)	By injection into the vein	Annually
Parathyroid hormone		
Teriparatide (Forsteo)	By injection under the skin (self-administered)	Daily for 18 months
Parathyroid hormone (Preotact)	By injection under the skin (self-administered)	Daily for 2 years
Other osteoporosis treatments		
Denosomab (Prolia)	By injection under the skin or into a muscle	Twice a year
Raloxifene (Evista)	By mouth	Daily
Calcitonin (Miacalcic)	By nasal inhalation	Daily – either long-term or (in treating painful vertebral fractures) for a few weeks
	By injection under the skin or into a muscle	Daily or twice daily for a few weeks
Strontium ranelate (Protelos)	By mouth (mixed with water)	Daily
Calcitriol (Racaltrol)	By mouth	Twice daily
Calcium and vitamin D (usually used in addition to other treatments)		
Calcium and vitamin D in combination	By mouth	Daily or twice daily
Calcium only	By mouth	Daily or twice daily

Intravenous treatment

If you can't tolerate bisphosphonates by mouth, it's possible to have them through a drip into a vein (intravenous infusion) or as an injection:

- **Pamidronate** is given as an infusion – this takes about an hour and can be repeated every three months.
- **Zoledronate** is also given as an infusion – this takes 20 minutes or more but is only given once a year.
- **Ibandronate** can be given by mouth (monthly) or by intravenous injection (every three months). The injection takes seconds.

What are the possible side-effects?

Bisphosphonates are generally well tolerated. The risk of digestive problems with the oral preparations is greatly reduced if you strictly follow the instructions that come with your medicine. Less common side-effects include:

- itchy rashes or photosensitivity (rash on exposure to sunlight)
- a sore mouth
- flu-like symptoms (more common with intravenous treatments)
- bone pain (more common with intravenous treatments)
- muscle pain
- headaches.

You should report any side-effects to your doctor or rheumatology nurse and the drug may be stopped if necessary.

There are three **very rare** side-effects:

- Osteonecrosis of the jaw is a condition where healing is incomplete following an invasive dental procedure. An area of bone is exposed through the gum and a small amount of bone dies. This condition is more common if you have cancer, are having chemotherapy, or you have severe, recurrent dental infections and are having dental treatment.
- It's been suggested that there's a possible, though small, increase in the risk of cancer of the oesophagus (gullet) in people taking bisphosphonates by mouth for more than 3–5 years. However, the evidence is mixed and in most situations, the benefits of treatment are greater than any potential risk.
- Some people taking bisphosphonates have developed painful, partial or complete fractures in the upper, outer region of the thigh bone (femur) below the hip. Partial fractures are usually confirmed by a special diagnostic scan. The risk appears to increase the longer you've been taking these drugs, and may be greater if you're also having steroid treatment or have diabetes. However, it's still extremely rare.

Your doctor will review your treatment from time to time to make sure the benefits of the treatment still outweigh the risks. Most specialists limit treatment with oral bisphosphonates to five years (and intravenous zoledronate to three years) to minimise the risks of rare, long-term side-effects. However, some people will require more lengthy treatment.

What else should I know about bisphosphonates?

It's important to get enough calcium and vitamin D as a lack of these can lessen the effect of bisphosphonates. You may be prescribed a daily supplement of calcium and/or vitamin D.

During bisphosphonate therapy you should maintain good oral hygiene and have regular dental check-ups. If you're expecting to have dental work it's usually best if this can be completed before starting bisphosphonates. However, it may not be necessary to stop your bisphosphonates if you do need dental treatment later on. If in doubt, check with your doctor.

Teriparatide and parathyroid hormone

Parathyroid hormone is naturally produced by four small glands in the neck and helps regulate calcium levels in your blood. Teriparatide is very similar to the naturally-occurring hormone. It helps new bone formation and so reduces the risk of fractures. It's usually used only in severe cases of osteoporosis, particularly in those with several fractures, in people with very low bone density, or when other treatments haven't been effective. A synthetic form of parathyroid hormone itself is also available.

Teriparatide and parathyroid hormone come in a pen-like syringe. You can inject yourself under the skin (subcutaneously), usually in the abdomen or thigh. Your healthcare team will show you how to do this.

Teriparatide is usually given every day for 18 months and for a maximum of two years.

What are the possible side-effects?

Teriparatide is usually very well tolerated. Possible side-effects include:

- gastrointestinal side-effects e.g. nausea, reflux symptoms
- palpitations
- dizziness
- headache
- fatigue
- depression
- slight irritation at the injection site
- occasional troublesome bone pain.

What else should I know about teriparatide and parathyroid hormone?

It must not be given if you have high calcium levels or if you have overactive parathyroid glands, cancers that involve the bone or Paget's disease. It shouldn't be used if you've had radiotherapy to your bones, for example as part of breast cancer treatment.

Raloxifene

Raloxifene is used to treat spine osteoporosis in post-menopausal women following a fracture. It has some of the same beneficial effects on bone as oestrogen. For example, it increases the density of the vertebrae (the bones of the spine) and reduces vertebral fracture rates. It also reduces the risk of breast cancer. However, there's a very small

increased risk of deep vein thrombosis (DVT) and isn't usually suitable for older women.

Raloxifene is taken in 60 mg tablets once a day.

What are the possible side-effects?

A small minority of women experience uncomfortable hot flushes, leg cramps, swollen ankles and flu-like symptoms.

Less common side-effects include blood clots in the legs or inflammation in the leg veins. This treatment isn't used if you have a history of leg clots, womb cancer or liver disease.

Your doctor will probably suggest an alternative treatment if you're already having menopausal symptoms since raloxifene can increase these.

Calcitonin

In the UK, calcitonin is no longer available as a nasal spray for long-term treatment of osteoporosis. However, it may be given by injection either under the skin (subcutaneous) or into a muscle (intramuscular) as a short-term treatment to prevent bone loss if you're suddenly immobilised following an osteoporotic fracture. In this case, it will be used only for 2–4 weeks.

What are the possible side-effects?

Possible side-effects include nausea, vomiting, diarrhoea, abdominal pain, flushing, dizziness, headache, musculoskeletal pain and taste disturbance.

Denosumab

Denosumab works by blocking a protein called RANK ligand, which occurs naturally in the body. Blocking this protein limits the activity of cells that break down bone (osteoclasts) and therefore increases bone mass and strength.

Denosumab is recommended for postmenopausal women who can't take bisphosphonates and also for men who develop osteoporosis as a result of treatment for prostate cancer.

Denosumab is given as an injection under the skin twice a year.

What are the possible side-effects?

Common possible side-effects include:

- occasional skin infections (cellulitis) at the site of injection
- back pain
- arm and leg pain
- urinary tract infections
- constipation
- rash.

Less common side-effects include low blood calcium (your blood levels will be checked before you start treatment) and, rarely, osteonecrosis of the jaw and partial fractures similar to those described above for bisphosphonates.

Strontium ranelate

Strontium ranelate is thought to work by both speeding up the formation of new bone tissue and slowing the breakdown of old bone material. Trials have shown that strontium ranelate reduces the risk of

spine and hip fractures in people who've already had a fracture, as well as those with low bone density.

Strontium ranelate is only available to people who can't use other osteoporosis treatments, and isn't suitable for people who have a history of heart disease or circulatory problems such as blood clots, stroke, heart attack, obstruction of the blood flow in the arteries or uncontrolled high blood pressure.

Strontium is taken as a powder (strontium ranelate) which you mix with water. It's taken once daily, at least 2 hours before or after food. Most people find it convenient to take it 2 hours after their evening meal and before going to bed.

You should avoid products containing lots of calcium (e.g. milk, yogurt) after taking strontium.

What are the possible side-effects?

Some people taking strontium develop mild diarrhoea which may prevent longer-term use. Occasionally strontium causes nausea or rashes and there's a small increased risk of DVT. You will have regular checks for any signs of heart or circulatory problems.

Hormone replacement therapy (HRT)

For many years, HRT was the only established medication for the prevention and treatment of post-menopausal osteoporosis. However, its use was always limited by its side-effects. Now that other treatments have been introduced, HRT is mainly used as a short-term treatment for women up to the age of 60 with increased

fracture risk who also have troublesome menopausal symptoms, as HRT is very effective in relieving these symptoms.

What are the possible side-effects?

Side-effects include a small increased risk of breast and ovarian cancer, DVT, heart attacks, strokes and memory impairment though the risk of these is greater in women over the age of 60. These risks are balanced by a reduction in the risk of hip fracture and colon cancer.

What else should I know about osteoporosis treatments?

Taking other medicines

It's usually fine to take other medicines alongside the treatments described above, but check with your doctor or pharmacist before starting any new medications.

Having vaccinations

There's no reason why you shouldn't have vaccinations or immunisations during treatment.

Drinking alcohol

Alcohol is unlikely to interfere with any of the medications used to treat osteoporosis. However, heavy drinking is a risk factor which can lead to osteoporosis so it's recommended that you drink alcohol only in moderation.

Fertility, pregnancy and breastfeeding

Osteoporosis usually affects older people, and there's therefore little evidence available concerning the use of osteoporosis treatments by women who are pregnant or breastfeeding.

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Bisphosphonates can cross the placenta to the unborn baby and can also pass into breast milk in small amounts, although there's no clear evidence that this is harmful to the child. As a precaution, it's recommended that treatment with bisphosphonates is stopped at least three months before trying for a baby and while breastfeeding.

Teriparatide and parathyroid hormone are usually only used for the most severe forms of progressive osteoporosis so are unlikely to be used in women of childbearing age.

Raloxifene and strontium ranelate aren't usually recommended for pre-menopausal women. They're probably best avoided if you're pregnant or breastfeeding, as it's not known how they might affect a baby's development. They may also increase the risk of DVT, which is already increased in pregnancy.

Self-help and daily living

There's a great deal you can do at different stages in your life to help protect yourself against osteoporosis.

Exercise

Weight-bearing exercises (any activity that involves walking or running) is better for bone strength than non-weight-bearing exercises such as swimming and cycling, but all forms of exercise will help to improve co-ordination and keep up muscle strength. This is important because muscle loss as we get older (called sarcopaenia) is a risk factor for

falling and therefore for fractures. T'ai chi in particular can be effective in reducing the risk of falls.

i See Arthritis Research UK booklets
Keep moving.

Diet and nutrition

Calcium

The best sources of calcium are:

- dairy products such as milk, cheese and yogurt – low-fat ones are best
- calcium-enriched types of milk made from soya, rice or oats
- fish that are eaten with the bones (such as tinned sardines).





Other sources of calcium include leafy green vegetables (for example cabbage, kale, broccoli), watercress, beans and chickpeas, and some nuts, seeds and dried fruits. See Figure 5 for more information on the calcium content of some common foods.

If you don't eat many dairy products or calcium-enriched substitutes, then you may need a calcium supplement. We recommend you discuss this with your doctor or a dietitian.

Vitamin D

Vitamin D is needed for the body to absorb and process calcium and there's some evidence that arthritis progresses more quickly in people who don't have enough vitamin D.

Vitamin D is sometimes called the sunshine vitamin because it's produced by the body when the skin is exposed to sunlight. A slight lack (deficiency) of vitamin D is quite common in the UK in winter. The National Institute for Health and Clinical Excellence (NICE) have issued guidance on safe sunlight exposure which aims to balance the benefits of vitamin D against the risks of skin cancer from too much exposure to sunlight:

<http://www.nice.org.uk/guidance/ng34>

Vitamin D can also be obtained from the diet (especially from oily fish) or from supplements such as fish liver oil. However, it's important not to take too much fish liver oil.

If you're over 60, dark-skinned or don't expose your skin to the sun very often and are worried about a lack of vitamin D, you should discuss with your doctor

whether a vitamin D supplement would be right for you. It's sometimes necessary to take a daily supplement containing 10–20 micrograms (µg), or 400–800 international units (IU), of vitamin D, especially for people over 60.

For many people, calcium and vitamin D supplements are often prescribed together with other osteoporosis treatments.

i See Arthritis Research UK booklet *Diet and arthritis*.

Figure 5 Approximate calcium content of some common foods

Food	Calcium content
115 g (4 oz) whitebait (fried in flour)	980 mg
60 g (2 oz) sardines (including bones)	260 mg
0.2 litre (½ pint) semi-skimmed milk	230 mg
0.2 litre (½ pint) whole milk	220 mg
3 large slices brown or white bread	215 mg
125 g (4½ oz) low-fat yogurt	205 mg
30 g (1 oz) hard cheese	190 mg
0.2 litre (½ pint) calcium-enriched soya milk	180 mg
125 g (4½ oz) calcium-enriched soya yogurt	150 mg
115 g (4 oz) cottage cheese	145 mg
3 large slices wholemeal bread	125 mg
115 g (4 oz) baked beans	60 mg
115 g (4 oz) boiled cabbage	40 mg

Note: measures shown in ounces or pints are approximate conversions only.

What else might help?

It's important to try to prevent falls. There are a few simple things you can do at home to help you avoid falls there. This includes mopping up spills and making sure walkways are free from clutter and trailing wires. Some hospitals also offer falls preventions clinics or support groups – ask your doctor if there's one in your local area.

Smoking can affect your hormones and may therefore increase your risk of osteoporosis. We strongly recommend you stop smoking. Support is available if you wish to stop.

Drinking a lot of alcohol can also affect the production of new bone, so we recommend keeping within the maximum amounts (14 units per week) suggested by the government.

Vitamin D, the sunshine vitamin, is produced when the skin is exposed to sunlight.

Research and new developments

Important research has led to the production of the FRAX[®] assessment tool, which is now being used by doctors to measure a patient's risk of having an osteoporotic fracture.

A key focus is also being placed on the development of systems to identify people who have already fractured in order to try to prevent further fractures. 'Capture the Fracture' is a new scheme from the International Osteoporosis Foundation (IOF) which aims to reduce the number of secondary fractures by coordinating healthcare more effectively. You can find out more at www.iofbonehealth.org/capture-fracture

The National Osteoporosis Society (NOS) has launched the 'Stop at one' campaign, which aims to make the symptoms of osteoporosis more widely known and encourage people to seek early diagnosis and treatment. Visit stopatone.nos.org.uk for more information.

The Centre for Integrated research into Musculoskeletal Ageing (CIMA), which is jointly funded by the Medical Research Council (MRC) and Arthritis Research UK, is conducting a programme of research that will help us better understand why our bones, joints and muscles function less well as we get older, and eventually develop ways of preventing age-related musculoskeletal problems such as osteoporosis.

Glossary

Analgesics – medications used to reduce pain levels.

Bisphosphonates – drugs used to prevent the loss of bone mass and to treat bone disorders such as osteoporosis and Paget's disease. They work by slowing down bone metabolism.

Body mass index (BMI) – a measurement used to estimate whether a person's weight is appropriate for their height. BMI is calculated by using the following equation: $BMI = w \div (h \times h)$, where w = weight in kilograms and h = height in metres. A BMI of between 19 and 25 is considered to be an ideal weight.

Coeliac disease – a condition where an extreme sensitivity to gluten (found in wheat, rye and other cereals) damages the lining of the small intestine, preventing the digestion and absorption of food. Coeliac disease is a permanent condition that can be treated by a strict gluten-free diet.

Collagen – the main substance in the white, fibrous connective tissue that's found in tendons, ligaments and cartilage. This very important protein is also found in skin and bone.

Deep vein thrombosis – a blood clot that forms in the deep-lying veins (usually in the leg or pelvis).

Density – how compact a substance is. Bone density refers to the amount of mineral per square centimetre of bone. It's measured using a DEXA scan.

Diabetes – a medical condition that affects the body's ability to use glucose (sugar) for energy. The body needs insulin, normally produced in the pancreas, in order to use glucose. In diabetes the body may produce no insulin or not enough insulin or may become resistant to insulin. When the body is unable to use glucose obtained from foods, the level of sugar in the blood increases. If untreated, raised blood sugar can cause a wide variety of symptoms.

Hyperthyroidism – overactivity of the thyroid gland which means that too much thyroid hormone is produced. The excess of thyroid hormones overstimulates metabolism, which speeds up various body systems, causing symptoms such as an increased heart rate, nervousness, weight loss, sweating, fatigue and sensitivity to heat. It's also a cause of osteoporosis.

Inflammatory bowel disease (IBD) – a group of inflammatory conditions that affect the small and/or large intestine. The symptoms can include abdominal pain, bleeding, weight loss, fatigue and diarrhoea. The two main types of IBD are Crohn's disease and ulcerative colitis.

Menopause – the time when menstruation ends, usually when a woman is in her 50s. This means the ovaries stop releasing eggs every four weeks, and it's no longer possible to have children. If this happens before the age of 45, it's known as premature menopause.

Non-steroidal anti-inflammatory drugs (NSAIDs) – a large family of drugs, prescribed for arthritis and other conditions, that reduce inflammation and control pain, swelling and stiffness. Common examples include ibuprofen, naproxen and diclofenac.

Oestrogen – one of a group of hormones in the body that control female sexual development and the reproductive cycle.

Osteogenesis imperfecta – a genetic condition existing at birth (congenital) resulting in fragile bones that fracture easily. The whites of the eyes of affected individuals often appear blue.

Rheumatoid arthritis – an inflammatory disease affecting the joints, particularly the lining of the joint. It most commonly starts in the smaller joints in a symmetrical pattern – that is, for example, in both hands or both wrists at once.

Testosterone – one of a group of hormones in the body that control male sexual and reproductive development.

Where can I find out more?

If you've found this information useful you might be interested in these other titles from our range:

Self-help and daily living

- *Diet and arthritis*
- *Keep moving*

Drug leaflets

- *Painkillers and NSAIDs*
- *Steroid tablets*

You can download all of our booklets and leaflets from our website or order them by contacting:

Arthritis Research UK

Copeman House
St Mary's Court
St Mary's Gate, Chesterfield
Derbyshire S41 7TD
Phone: 0300 790 0400
www.arthritisresearchuk.org

Arthritis Research UK

Osteoporosis

Related organisations

The following organisations may be able to provide additional advice and information:

Arthritis Care

Floor 4, Linen Court

10 East Road

London N1 6AD

Phone: 020 7380 6500

Helpline: 0808 800 4050

Email: info@arthritiscare.org.uk

www.arthritiscare.org.uk

Food Standards Agency

Aviation House

125 Kingsway

London WC2B 6NH

Helpline: 020 7276 8829

Email: helpline@foodstandards.gsi.gov.uk

www.food.gov.uk

National Osteoporosis Society

Camerton

Bath BA2 0PJ

Phone: 01761 471771

Helpline: 0845 450 0230

Helpline email: nurses@nos.org.uk

www.nos.org.uk

<http://stopatone.nos.org.uk>

NHS Choices

The NHS Choices website has useful information on falls and falls prevention: www.nhs.uk/Conditions/Falls/Pages/Introduction and on getting vitamin D from sunlight: <http://www.nhs.uk/livewell/summerhealth/pages/vitamin-d-sunlight.aspx>

Links to third-party sites and resources are provided for your general information only. We have no control over the contents of those sites or resources and we give no warranty about their accuracy or suitability. You should always consult with your GP or other medical professional.

Please note: We've made every effort to make sure that this content is correct at time of publication. If you would like further information, or if you have any concerns about your treatment, you should discuss this with your doctor, rheumatology nurse or pharmacist.



We're here to help

Arthritis Research UK is the charity leading the fight against arthritis.

We fund scientific and medical research into all types of arthritis and musculoskeletal conditions.

We're working to take the pain away for sufferers with all forms of arthritis and helping people to remain active. We'll do this by funding high-quality research, providing information and campaigning.

Everything we do is underpinned by research.

We publish over 60 information booklets which help people affected by arthritis to understand more about the condition, its treatment, therapies and how to help themselves.

We also produce a range of separate leaflets on many of the drugs used for arthritis and related conditions. We recommend that you read the relevant leaflet for more detailed information about your medication.

Please let us know if you'd like to receive an email alert about our quarterly online magazine, *Arthritis Today*, which keeps you up to date with current research and education news, highlighting key projects that we're funding and giving

insight into the latest treatment and self-help available.

We often feature case studies and have regular columns for questions and answers, as well as readers' hints and tips for managing arthritis.

Tell us what you think

Please send your views to:

**bookletfeedback@
arthritisresearchuk.org**

or write to us at:

Arthritis Research UK, Copeman House, St Mary's Court, St Mary's Gate, Chesterfield, Derbyshire S41 7TD

A team of people contributed to this booklet. The original text was written by Prof. Cyrus Cooper and Dr Tom Palferman, who have expertise in the subject. It was reviewed at draft stage by consultant rheumatologists Dr Ian Giles and Dr Dipak Roy. An **Arthritis Research UK** editor revised the text to make it easy to read. An **Arthritis Research UK** medical advisor, Dr Luke Gompels, is responsible for the content overall.

Get involved

You can help to take the pain away from millions of people in the UK by:

- volunteering
- supporting our campaigns
- taking part in a fundraising event
- making a donation
- asking your company to support us
- buying products from our online and high-street shops.

To get more **actively involved**, please call us on **0300 790 0400**, email us at **enquiries@arthritisresearchuk.org** or go to **www.arthritisresearchuk.org**



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calls charged at standard rate

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