

Osteoporosis: an overview

With the National Osteoporosis Society (NOS) Osteoporosis and Bone Conference 2012 taking place this month at the Manchester Central Convention Complex, we review the latest news and advances in bone health.

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The field of osteoporosis is evolving. Approximately three million people in the UK are thought to have osteoporosis, and there are over 250,000 fractures every year as a result. Although commonly associated with post-menopausal women, osteoporosis can also affect men, younger women and children.¹

What is osteoporosis?

Osteoporosis literally means “porous bones” and is often referred to as the “fragile bone disease”. Bones stop growing in length between the ages of 16 and 18 years, but bone density continues to increase slowly until a person is in their mid 20s. At this point the balance between bone demolition and bone construction stays stable. After the age of 35 years, bone loss increases very gradually as part of the natural ageing process. This bone loss becomes more rapid in women for several years following the menopause and can lead to osteoporosis and an increased risk of broken bones, especially in later life.

The older we get, the greater our risk of breaking a bone.

Osteoporosis becomes more common as the density of bone decreases and bones become generally less strong and more fragile. Falling is also much more common because of poor balance and co-ordination leading to a higher risk of breaking a hip. Lifestyle changes and keeping active can help to prevent falling. Drug treatments, to strengthen bones, are available for those at highest risk of fracture.

Pharmacological management

Bisphosphonates

These are the most commonly prescribed drugs used to treat osteoporosis. The main drugs in this range are alendronic acid or alendronate (Fosamax), cyclical etidronate (Didronel PMO), ibandronate (Bonviva), risedronate (Actonel) and zoledronic acid (Aclasta). These drugs have been shown to reduce the risk of broken bones in the spine, and in some cases, the hip.²

They are licensed to treat post-menopausal women and some are licensed for men and people taking corticosteroids

for conditions such as asthma/arthritis. Most are available in tablet form—either daily, weekly or monthly—they are non-hormonal and act by slowing down the rate of bone loss. Side effects can include irritation of the gullet and these drugs may not be suitable for people with stomach/bowel trouble or kidney problems.

Ibandronate and zoledronic acid are administered in hospital via a drip or injection into a vein in the arm. These are often prescribed by specialists rather than GPs. Pamidronate (Aredia—also administered via a drip) is only prescribed by specialists as it is not licensed to treat osteoporosis.²

Raloxifene (Evista)

Raloxifene (Evista) is a selective estrogen receptor modulator (SERM). This type of drug, which is taken as a daily tablet, mimics the action of the female hormone oestrogen, giving protection to bones while simultaneously blocking the oestrogen’s effect on other organs, such as the womb and breast. It is only prescribed to women to reduce the risk of spinal fractures and may be used if bisphosphonates are not suitable. Raloxifene (Evista) is

currently the only SERM licensed to treat osteoporosis.

Strontium ranelate (Protelos)

Strontium ranelate appears to have an impact on both the cells that build bone and those that break it down. It is unclear how this works to reduce the risk of broken bones. Strontium ranelate (Protelos) is a sachet of powder which is mixed in water and is taken once a day at bedtime.²

Parathyroid hormone (PTH) treatment (Preotact, Forsteo)

Parathyroid hormone injections can only be prescribed to those people most severely affected by spinal fractures who meet certain criteria. It works by building new bone and is given as self-administered injections daily for between 18 and 24 months. It is not prescribed by GPs and is only available from specialists.²

Denosumab (Prolia)

Denosumab belongs to a group of drugs called “monoclonal human antibodies”. It blocks a substance involved in bone development called Rank Ligand that stimulates the activity of osteoclasts—the cells that break down bone. As a result bones become stronger and break less easily. This drug is given as an injection under the skin every six months usually in a hospital clinic although it may be available in some GP surgeries.²

Calcium and vitamin D

There are a number of calcium and vitamin D supplements which are most often prescribed by doctors to older people to help prevent broken bones. These include: Accrete D3; Adcal; Cacit

Tablets; Calceos; Calcichew; Calcium 500; Calcium-Sandoz; Calfovit D3; Kalcipos-D; Natecal D3 and Sandocal 1000.

Other treatments

Calcitonin (Miacalcic)

Calcitonin (Miacalcic) is available both as a nasal spray for long term use and an injection. The injection (administered every day) is particularly useful as a short term treatment after spinal fractures. Calcitonin may have a pain relieving effect for some people, so can help with acute pain whilst also giving bone protection. However, calcitonin is rarely used by GPs and only occasionally prescribed by specialists.²

Calcitriol (Rocaltrol)

Calcitriol (Rocaltrol) is effective in reducing fractures in women and is taken as a daily dose of tablets. There is no data on its effectiveness in preventing broken bones in men with osteoporosis but it may be prescribed at specialist centres. It can be prescribed by GPs but people on this drug need careful monitoring. Some GPs may refer patients to a specialist.²

Hormone Therapy or Hormone Replacement Therapy (HRT)

Hormone therapy or hormone replacement therapy replaces oestrogen (and sometimes progesterone) in women and testosterone in men. HRT in women is no longer a first line treatment for osteoporosis but is useful to tackle menopausal symptoms with added bone protection back-up.

Non pharmacological management

It is important people at risk of osteoporosis take steps to help keep bones healthy and reduce their risk of developing the condition. This may include:

Regular exercise:

Adults should do at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity (ie. cycling or fast walking) every week. Weight-bearing exercise and resistance exercise are particularly important in improving bone density and helping prevent osteoporosis.

Healthy eating:

Calcium is important for maintaining strong bones. The recommended intake of calcium is at least 700mg a day. This is about equivalent to one pint of milk. Calcium can also be found in a number of different foods, including green leafy vegetables, dried fruit, tofu and yoghurt. Vitamin D is also important for bones and teeth as it helps your body to absorb calcium. Vitamin D can be found in eggs, milk and oily fish. However, most vitamin D is made in the skin in response to sunlight. A short exposure to sunlight, without sunscreen (10 minutes twice a day) throughout the summer should provide a patient with enough vitamin D for the whole year.¹

Other factors

Other lifestyle factors that can help prevent osteoporosis include:

- quitting smoking: cigarette smoking is associated with an increased risk of osteoporosis

- limiting alcohol intake: the recommended daily limit is three to four units of alcohol for men and two to three units for women, although it is important to also avoid binge drinking

Risk factors

The factors that can put people at risk of osteoporosis and fractures include:

Genes

Bone health is largely dependent on the genes inherited from our parents. In fact, if one of your parents has broken a hip, you may be more susceptible to developing osteoporosis and fragile bones.²

Age

Bone loss increases in later life so by the age of 75 about half of the population will have osteoporosis. As we get older bones become more fragile and more likely to break.²

Gender

Women have smaller bones than men and they also experience the menopause which accelerates the process of bone turnover. The female hormone oestrogen has a protective effect on bones. At the menopause the ovaries almost stop producing this hormone reducing the protection it gives to bones.²

Race

People who are Black Afro Caribbean are at a lower risk because they have bigger and stronger bones.²

Low body weight

Patients with low BMI (body mass

index) below 19g/m² are at greater risk of developing osteoporosis.²

Previous fractures

If a patient has already broken bones easily, including in the spine, then they are much more likely to have fractures in the future.

Some medical conditions increase the risk including:

- Rheumatoid arthritis
- Low levels of oestrogen in women as a result of early menopause, having a hysterectomy with removal of ovaries (before the age of 45 years), anorexia nervosa or Turners syndrome. Excessive exercise can also reduce hormone levels
- Low levels of testosterone in men following surgery for some cancers. Some rare conditions that men are born with such as Klinefelters disease or Kallmans syndrome also lower testosterone levels
- Hyperthyroidism when levels of thyroid hormone are abnormally high
- Parathyroid disease when levels of parathyroid hormone are abnormally high
- Conditions that affect the absorption of food such as Crohns or coeliac disease
- Conditions that cause long periods of immobility.

Other conditions may be associated with osteoporosis such as diabetes and HIV (AIDS). People who have had an organ transplant or who have experienced respiratory diseases may also be at increased risk, as well as people who have undergone gender reassignment especially if hormone therapy is discontinued.

Investigations

Osteoporosis is often diagnosed after the weakening of the bones has led to a fracture. A DEXA (dual energy X-ray absorptiometry) scan can help diagnose osteoporosis. It measures bone mineral density (BMD) and compares it to the bone density of a healthy young adult. The difference between your BMD measurement and that of a healthy young adult is calculated as a standard deviation (SD) and called a T score. Standard deviation is a measure of variability based on an average or expected value. A T score of:

- Above -1 is normal
- Between -1 and -2.5 is classed as osteopenia (where bone density is lower than average but not low enough to be classed as osteoporosis)
- below -2.5 is classed as osteoporosis

A bone density scan can help diagnose osteoporosis, but a BMD result is not the only factor that determines the risk of fracturing a bone. Age, sex and any previous injuries will be assessed before a decision is usually made to start treatment for osteoporosis.

The World Health Organisation (WHO) has developed a 10-year fracture prediction tool (FRAX) for use in people aged between 40 and 90.

Patients can calculate their own fracture risk by visiting the FRAX tool website. (<http://www.shef.ac.uk/FRAX/>).

1. <http://www.nhs.uk/Conditions/Osteoporosis/Pages/Introduction.aspx>
2. <http://www.nos.org.uk/page.aspx?pid=264&srcid=234>