

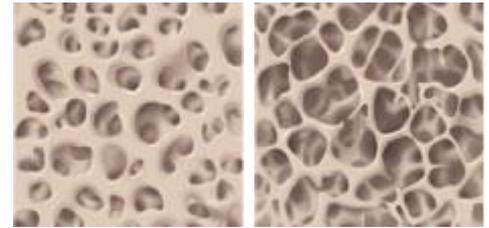
## Osteoporosis

This article is adapted from one written by Dr Susannah O'Sullivan, an endocrinologist with Fertility Associates Auckland and senior lecturer at the Departments of Pharmacology and Medicine, University of Auckland.

Osteoporosis is a condition where the bones become excessively thin and weak, such that there is a greater risk of fractures. It affects more than 50% of women and about 30% of men over 60 years, as well as a small number of younger people. Osteoporosis is often called the 'silent disease' as you do not have symptoms until it reaches a stage where you break a bone.

Fractures of the spine are most common, and may present as back pain or loss of height. Wrist fractures (Colles) are more common in women, and often occur following a fall onto the outstretched hand. Hip fractures are more common in older people (>70 years) and can cause significant pain and disability, reduced quality of life and an increase risk of death.

Bones contains collagen and minerals such as calcium & phosphorus, which makes it hard & dense. Vitamin D is needed so the body can absorb calcium from food and incorporate it into bone. Physical activity also helps bone become dense. Hormones like oestrogen in women & testosterone in men are required to maintain bone density.



Normal bone

Osteoporotic bone

People with the following risk factors are at higher risk of developing osteoporosis.

- Being female particularly after menopause
- Advancing age
- Family history of osteoporosis
- Low body weight
- Too little calcium in your diet - less than four servings of dairy products a day
- Smoking
- Alcohol (>4 standard drinks a day)
- < 30 minutes of physical activity each day
- Premature menopause in women or hypogonadism in males
- Long term use of some medications, such as steroids (eg, cortisone, prednisone) or anticonvulsants
- Some medical conditions (e.g. rheumatoid arthritis, chronic liver disease).

If your doctor suspects osteoporosis from your medical history and lifestyle factors he/she may suggest doing a DXA scan (Dual-emission X-ray absorptiometry). A DXA scan uses small amounts of X-ray to measure BMD bone mineral density. The WHO World Health Organisation classification of osteoporosis is based on the standard deviation (SD) difference between a patient's BMD and that of a young-adult population (T score). A T score 2.5 SD or more below the young adult mean is defined as osteoporosis.

Your doctor may combine BMD testing with your clinical risk factors to more accurately predict your risk of fractures. One of the best known tools is the WHO Fracture Risk Assessment Tool (FRAX), which estimates 10-year probability of a major osteoporotic fracture for an untreated person. Check this out at <http://www.shef.ac.uk/FRAX/tool.jsp?country=23>. If your BMD is lower than expected for your age, gender and ethnicity, your doctor may recommend you have some blood tests to look for other causes for your low BMD.

Food	Calcium (mg)
Milk 225ml glass	300
Yoghurt 150g pottle	300
Cheddar Cheese 3 slices	300
Cottage cheese ½ cup	130
Ice cream or frozen yoghurt ½ cup	100
Soy milk 1 cup	100
Tofu ½ cup	200
Baked beans 1 cup	100
Sardine 1 can	300
Dark leafy green vegetables ½ cup cooked	50-135
Almonds 24 whole	70
Oranges 1 medium	60

## What can be done about osteoporosis?

Lifestyle measures are recommended for all as detailed below. Medium intensity weight-bearing exercise aiming at 30 minutes should be undertaken at least three times a week (eg. Walking). Smoking cessation should be attempted, and alcohol intake should be limited to 2 standard drinks per day (preferably with some alcohol free days).

Calcium intake of 1000-1500mg is considered desirable. If calcium intake is inadequate (<1000mg/day), supplements may be prescribed. Calcium supplementation is an area of recent controversy due to concern about an increased risk of heart attacks in elderly with a total calcium intake of 1500-2000mg/day. In those over 70years, it is recommended that total calcium (diet and supplements) be limited to 1000mg/day. It is also important to be aware that calcium can interfere with iron and thyroid hormone medications, which should be taken at a different time from calcium.

Vitamin D increases with sunlight exposure, but synthesis is affected by sunscreens, and ageing. Supplementation is recommended in those at risk (eg. Elderly in institutionalised care, previous osteoporotic fractures), without needing to measure blood levels of Vit D. Supplements are usually in the form of a monthly tablet.

Bisphosphonates are bone-specific medicines that increase bone density and reduce fractures. They are currently the preferred treatment for osteoporosis. The three commonly available in NZ are etidronate, alendronate and, more recently, zoledronic acid.

Oral Alendronate (eg. Fosamax) is taken weekly and has been shown to reduce the risk of all types of fractures by at least 30%. The main side effects are gastrointestinal (oesophagitis & ulcers). To minimise this risk and maximise absorption, it should be taken alone, on an empty stomach, first thing in the morning, with at least a 240ml glass of water, with no food, drink, medications or supplements for at least 30 minutes (you should remain upright during this time).

An alternative is a once yearly intravenous infusion of zoledronic acid (Aclasta). This has been fully funded under Special Authority from Sept 2010, and can be done in the GP clinic. Zoledronic acid is at least as effective as

## Q & A

*Most acromegalics have low levels of sex hormones, and many male members are on testosterone and females on oestrogen replacements. What is the risk of osteoporosis for those who are on hormone replacement? How do we know if the replacement dose is adequate*

Dr O'Sullivan: Low levels of sex hormones is known as hypogonadism. If you are adequately replaced on oestrogen or testosterone, then bone mineral density will be preserved. Adequacy of replacement in men is assessed by measuring testosterone and by evidence of effect (i.e. need to shave, libido, well-being). In women, the dose of oestrogen (either in the form of a COC (combined oral contraceptive) or HRT (hormone replacement therapy) and is tailored to treat symptoms and avoid side-effects. Some women with secondary hypogonadism don't experience menopausal symptoms, so these can't always be used to determine effectiveness of replacement. You can also measure oestradiol levels, but this isn't often done.

*Also some of us are on prednisone/hydrocortisone replacement therapy, would this low dosage impact on our bone health? Would you suggest BMD monitoring or medical treatment?*

Dr O'Sullivan: Reduced production of steroid hormones in pituitary conditions is known as secondary hypoadrenalism. It is generally believed that if the dose of prednisone or hydrocortisone is at physiologic replacement levels (i.e. at levels to match what the body normally produces), then there should be no negative impact on bones. This is somewhat individual, but generally people with secondary hypoadrenalism require equivalent of 10-15mg daily of hydrocortisone. If you are on a higher dose and are developing Cushingoid features (i.e. evidence of excess steroid intake), then bone density may also be at risk. Some clinicians will periodically measure BMD.

Once people are beyond a certain age, screening should occur as for the general population.

alendronate in increasing BMD and reducing fracture risk. The main side-effects are flu-like symptoms such as fever, myalgia, headache, and arthralgia within 24 to 72 hours of the infusion, which can be minimised by using ibuprofen or paracetamol. A rare side-effect of bisphosphonate therapy is osteonecrosis of the jaw (ONJ). Although this has largely been described in cancer patients treated with high-dose intravenous bisphosphonates, there have been cases in patients with osteoporosis receiving oral bisphosphonates.

Hormone replacement therapy HRT is no longer the treatment of choice. However, in younger women with persistent menopausal symptoms and women who cannot tolerate other drugs, it may be a reasonable option. Other treatments available include selective oestrogen receptor modulators, tibolone, strontium, and teriparatide, each of which may be a reasonable alternative to potent bisphosphonates in some situations.

Treatment is generally monitored by regular BMD and clinical review. In general, this is performed about 2 years after starting pharmacologic therapy. In most cases, the GP will provide the diagnosis, management and monitoring of a patient with osteoporosis. Referral to a specialist in osteoporosis would be indicated if there is severe osteoporosis and in those who do not seem to be responding to therapy or are not tolerating first-line therapies.