



What is osteoporosis?

Osteoporosis occurs when the struts which make up the mesh-like structure within bones become thin causing them to become fragile and break easily, often following a minor bump or fall. These broken bones are often referred to as 'fragility fractures'. The terms 'fracture' and 'broken bone' mean the same thing. Although fractures can occur in different parts of the body, the wrists, hips and spine are most commonly affected. It is these broken bones or fractures which can lead to the pain associated with osteoporosis. Spinal fractures can also cause loss of height and curvature of the spine.

What do the parathyroid glands do?

The parathyroid glands are four small glands in the neck that lie behind the thyroid gland. They are too small to be seen or felt and they have no working connection to the thyroid gland. For more information about thyroid disease and osteoporosis see our leaflet *Thyroid disease and osteoporosis*.

The parathyroid glands control the levels of calcium and phosphorus in the blood and they do this by making a hormone called 'parathyroid hormone (PTH)'. If the blood calcium level is low, more PTH is produced to raise calcium levels in the blood. Once the blood calcium is back to normal limits the release of PTH is then suppressed. PTH works by reducing the loss of calcium through the kidneys, by increasing calcium absorption from the gut and by causing the release of calcium from the bones.

What is hyperparathyroidism?

Hyperparathyroidism is a medical term used when an excess of parathyroid hormone is released by the parathyroid glands which usually leads to high levels of calcium in the blood. This condition falls into three categories: primary, secondary (calcium may be low in this condition) and tertiary.

Primary Hyperparathyroidism (PHPT)

This is where one or more of the parathyroid glands have become enlarged and overactive releasing too much parathyroid hormone resulting in high levels of calcium in the blood.

The most common cause of an overactive parathyroid gland is due to the development of an 'adenoma' in the gland. This is a non-cancerous (benign) growth that makes too much parathyroid hormone. Less commonly one or more glands enlarge or just get too big which is known as 'hyperplasia' and, extremely rarely, primary hyperparathyroidism can be caused by cancer.

Primary hyperparathyroidism is common and thought to affect one in 1,000 people, although some studies suggest this could be higher. It is more common in women than in men and the rate increases with age in both sexes.

Secondary Hyperparathyroidism

In secondary hyperparathyroidism the four parathyroid glands secrete an excessive amount of parathyroid hormone as a result of long-term low blood calcium levels or high phosphate levels. This is usually due to other diseases or deficiencies affecting the body. The parathyroid glands are permanently being stimulated to try to raise the blood calcium levels and eventually they become enlarged and the amount of parathyroid hormone increases.

Some of the causes of secondary hyperparathyroidism are kidney disease, vitamin D deficiency and intestinal malabsorption where calcium cannot be absorbed from the gut.

Tertiary Hyperparathyroidism

Prolonged secondary hyperparathyroidism can sometimes lead to tertiary hyperparathyroidism. This occurs when the condition causing the secondary hyperparathyroidism is being treated but the parathyroid glands continue to produce large amounts of parathyroid hormone. This is because the glands are no longer sensitive to the blood calcium levels

and they do not 'switch off' PTH production when the blood calcium levels rise, resulting in high calcium levels in your blood. This condition is most frequently seen in people who have chronic kidney failure.

How is hyperparathyroidism diagnosed?

Hyperparathyroidism does not always cause symptoms and is often diagnosed when routine blood tests are taken that measure levels of calcium and phosphate. In primary hyperparathyroidism the blood calcium and parathyroid hormone levels will be persistently raised. In secondary hyperparathyroidism blood tests will show a raised parathyroid hormone level and low or normal calcium levels.

However if the blood calcium levels rise too high you may feel tired, sick (nauseated), have constipation, feel thirsty and pass large amounts of urine frequently.

How is hyperparathyroidism treated?

The treatment required will depend on the type and severity of hyperparathyroidism.

Primary hyperparathyroidism may not require any treatment if it is not causing any symptoms and the risk of having a problem in the future is low. If the calcium level is only slightly elevated and the bone and kidney health is close to normal then careful monitoring of blood calcium, kidney function, blood pressure and bone density may be all that is needed. However if you are experiencing symptoms or have had kidney stones, have low bone density or are under the age of 50 then treatment is usually recommended.

The most commonly recommended treatment is surgery to remove the affected gland(s) (parathyroidectomy). Pre-operative ultrasound scanning of the neck may be used to identify the affected gland and target surgery. Isotope scans of the parathyroid glands are used to help localise parathyroid adenomas if needed. A parathyroidectomy does not usually take very long and has a high chance of curing the condition.

In secondary hyperparathyroidism it is important to treat the underlying condition, for example treating vitamin D deficiency with vitamin D supplements.

Chronic kidney disease is a common cause of secondary hyperparathyroidism. People with chronic kidney disease will frequently have low vitamin D levels as the kidneys are unable to convert the vitamin into its active form. To overcome this reduced vitamin D metabolism by the kidneys, patients are given active forms of vitamin D (alfacalcidol or calcitriol) They also have raised phosphate levels so advice may be given

about reducing the amount of dietary phosphate. Foods high in phosphorus include milk and milk products, whole grains, dried beans and peas, nuts and seeds, offal, meat and fish, colas, chocolate and some types of baking powder.

For those people who have a very high level of calcium and in whom surgery is not an option then a drug known as Cinacalcet may be prescribed. This drug reduces the release of parathyroid hormone and lowers blood calcium back to a safe level.

Hyperparathyroidism and osteoporosis

If the parathyroid glands are producing too much parathyroid hormone then calcium will be released from bone stores. This has been shown to increase the risk of osteoporosis and broken bones by increasing the rate of bone turnover (the cycle of breakdown and renewal of bone). In some cases primary hyperparathyroidism may only come to light after a broken bone (fracture) has occurred.

If you have been diagnosed with hyperparathyroidism then a DXA (Dual energy x-ray absorptiometry) bone density scan may be performed to assess whether bone has been affected and your risk of breaking bones has increased.

Where surgery for primary hyperparathyroidism is performed the blood calcium levels reduce within 24 hours and bone density improvements can be expected over the following years. However if surgery is not performed then osteoporosis drug treatments such as bisphosphonates can be prescribed to reduce bone loss and your risk of breaking bones easily. Bone density can be monitored by the use of DXA and in some circumstances the bone density may be measured at the forearm as this may provide additional information that is useful for the doctor. Both parathyroidectomy and bisphosphonate treatment appear to have similar beneficial effect on the bones of patients with primary hyperparathyroidism.

For more information about all the drugs prescribed for osteoporosis see our leaflet *Drug treatments and osteoporosis*.

If secondary hyperparathyroidism has occurred due to vitamin D deficiency then it is important to treat with vitamin D supplementation. Vitamin D is a fat soluble vitamin which regulates the formation of bone and the absorption of calcium from the intestine. The usual treatment would be to give calciferol which is the form of vitamin D made by sunlight on the skin.

Are there any drug treatments for osteoporosis that need to be avoided?

Interestingly parathyroid hormone can be used as a treatment for osteoporosis to reduce the risk of breaking bones (fractures) in the form of Forsteo or Preatact. However if you have been diagnosed with hyperparathyroidism then treatment with the parathyroid hormone would not be appropriate. All other treatments for osteoporosis are suitable unless there is kidney failure.

Do you continue to take calcium tablets and/or reduce the calcium intake in your diet?

If the blood calcium levels are high due to this condition your doctor may advise you to stop taking calcium supplements, at least until the condition is stabilised.

Useful websites

Society for Endocrinology
You and your hormones website
www.yourhormones.info

Hypoparathyroidism UK (HPTH UK)
www.hpth.org.uk

Information leaflet from Patient UK
www.patient.co.uk

The **National Osteoporosis Society** is the only UK-wide charity dedicated to improving the prevention, diagnosis and treatment of osteoporosis and fragility fractures. The Charity receives no Government funding and relies on the generosity of individuals to carry out its vital work.

For osteoporosis information and support contact our Helpline:

 0808 800 0035

 nurses@nos.org.uk

To become a member or make a donation:

 01761 473 287

 join online at www.nos.org.uk

To order an information pack or other publications:

 01761 471 771

 info@nos.org.uk

or download from our website at
www.nos.org.uk

This fact sheet is one of a range of publications produced by The National Osteoporosis Society. If you would like more general information about osteoporosis see our booklet *All about Osteoporosis*.

This information reflects current evidence and best practice but is not intended to replace the medical advice provided by your own doctor or other health professional.