

Patient information on Hyperthyroidism from Dr Mark Vanderpump

About the thyroid and its function



The thyroid is a butterfly shaped gland in your neck which is situated just below your Adams Apple (the larynx). A normal thyroid gland is neither visible nor can be felt if you apply finger pressure to your neck.

It is the thyroid gland's job to produce hormones which regulate the body's metabolism of virtually all cells in the body. It does this by producing two thyroid hormones:

- Thyroxine (or T4) – which is relatively inactive
- Lower amounts of Tri-iodothyronine (or T3) which is active

20% of T3 is produced directly by the thyroid gland. The remaining 80% is by removal of an iodine molecule from T4 by the action of enzymes in the liver or kidneys.

When you are healthy your brain secretes thyrotrophin-releasing hormone (TRH) from the hypothalamus and your pituitary gland secretes thyroid stimulating hormone (TSH). Together these hormones regulate the overall production of T3 and T4 - a clever loop known as the "hypothalamic-pituitary -thyroid axis"

Hyperthyroidism

When the thyroid gland becomes affected by disease the production of T3 and T4 can become abnormally high and this leads to too much thyroid hormone in the bloodstream. This is known as hyperthyroidism (or thyrotoxicosis) – a condition easily detected by a simple blood test.

In this condition although your T3 and T4 levels are showing high, your TSH level will be undetectable because the pituitary gland is recognising the abnormally high levels.

About 1 in 100 people in the UK have hyperthyroidism and it is six times more common in women.

Causes of Hyperthyroidism

The two main causes that make up 90% of hyperthyroidism cases in the UK are:

1. Autoimmunity - causing stimulation of the thyroid gland
2. Overproduction of hormones by benign tumours in the thyroid gland

Hyperthyroidism caused by autoimmunity is known as "Graves' disease" because the Irish physician Robert Graves gave an early description of the condition. In autoimmune thyroid activity an abnormal antibody targets the TSH receptor on your thyroid gland and this stimulation causes the thyroid cells to grow – eventually leading to a thyroid enlargement or goitre and increased thyroid hormone production.

One third of those with Graves' disease also develop a variety of eye problems including a staring appearance, grittiness, soreness, protruding eyeballs and (rarely) double vision or sight problems. This is known as "thyroid eye disease" or "orbitopathy".

Cigarette smoking significantly increases the risk of developing thyroid eye disease in patients with Graves' disease.

The second cause – overproduction of hormones by benign tumours in the thyroid gland – causes excess thyroid hormone to be produced in an unregulated way. This becomes more common with older age and is referred to as either "solitary toxic nodule" or "toxic multinodular goitre" depending on the number of benign tumours.

A more rare cause of hyperthyroidism is an inflammatory condition of the thyroid called thyroiditis. This is sometimes a result of:

- Pregnancy
- Viruses
- Drugs such as amiodarone or interferon

Thyroiditis tends to be a self-limiting condition which self corrects - although in some prolonged cases anti-inflammatory tablets or steroids may be helpful.

All of the above types of thyroid are classified as "*primary*" this means they result from direct impairment of the thyroid gland's function. Very rarely there may be secondary thyroid over activity as a result of a pituitary problem through increased TSH production by a benign tumour.

Symptoms of Hyperthyroidism

- Fatigue
- Heat intolerance
- Sweating
- Weight loss despite good appetite
- Shakiness
- Inappropriate anxiety
- Palpitations of the heart
- Shortness of breath
- Tetchiness and agitation
- Poor sleep
- Thirst
- Nausea
- Increased stool movement

The elderly may complain of heart problems with a fast or irregular heartbeat, short of breath and ankle swelling, whilst children tend to hyperactivity with a short attention span.

Signs of Hyperthyroidism

- Shaky and hot hands
- Fast or irregular heartbeat
- Inability to sit still
- Flushing of the face and trunk
- Fast tendon reflexes
- Enlarged thyroid gland
- Prominent or bulging eyes

Diagnosis

None of the above signs and symptoms are sufficiently specific for the automatic diagnosis of hyperthyroidism - even when listed together. This means it may take 3 to 6 months to diagnose the problem during which time you might have felt very unwell. It's not uncommon for people to worry that they have cancer because of the associated weight loss, although they unusually have an increased appetite. Diagnosis can be made earlier due to increased awareness of the condition, greater availability and accuracy of blood tests.

Treatment

Betablockers

These can improve palpitations, slow the heart down and improve tremor. They have no effect on curing thyroid over activity but do make many people feel better. Betablockers are used with caution if you have asthma or a wheezy chest.

Antithyroid Drugs

Drugs like Carbimazole (Neomercazole) and Propylthiouracil are effective in reducing the production of thyroid hormones. For 50% of those with Graves' disease, 6 to 24 months' worth of treatment with one of these drugs will result in long term remission once that drug is stopped.

However, for patients with nodular thyroid over activity they are not a cure.

Both drugs have the common side effects of rash and joint pains and more rarely (less than 1 in 500 cases) a serious reduction in circulating white blood cells during treatment. According to your condition the dosage can be:

- Adjusted every 6 to 8 weeks or
- Kept at a fixed higher dose with the addition of levothyroxine

Radioiodine

In most people a small single dose of radioactivity is sufficient to destroy the thyroid tissue over the following 6 to 24 weeks.

Following treatment, 80% of those with Graves' disease have a high rate of permanent underactivity. Whereas patients with nodular thyroid over activity tend to better preserve their thyroid function with only about 50% eventually becoming underactive.

Since hyperthyroidism is a serious condition. It is felt that thyroid underactivity is an accepted consequence as this can simply be treated with levothyroxine which has no side effects at the correct dose.

Radioiodine is a safe treatment with no overall excess of cancers in many hundreds of thousands of patient follow ups. 10,000 doses are given annually in the UK.

There are some warnings:

- Women are advised not to become pregnant for 6 months following a dose
- Men should avoid fathering a child within 4 months of a dose
- Patients should take sensible precautions about minimising the radiation exposure to others
- Patients undergoing this treatment may trigger airport security alarms for up to 8 weeks following a dose and you should carry a letter about the treatment if you intend to travel during this period
- Patients with active thyroid eye disease may be required to take a short course of steroids

Thyroid Surgery

Provided thyroid activity is controlled prior to surgery, the removal of most or all of the thyroid gland is a straightforward operation with a low risk of complications when carried out by an experienced thyroid surgeon. The side effect of surgery is an underactive thyroid for which lifelong levothyroxine will be needed.