Thyroid Function Tests

Thyroid function tests are blood tests which help to check the function of your thyroid gland. They are mainly used to detect an underactive thyroid (hypothyroidism) and an overactive thyroid (hyperthyroidism).

Note: The information below is a general guide only. The arrangements, and the way tests are performed, may vary between different hospitals. Always follow the instructions given by your doctor or local hospital.

What is a thyroid function test?

Thyroid function tests are blood tests that check the levels of the chemicals (hormones) made by your thyroid gland. Some thyroid function tests also check the level of a hormone made by the pituitary gland in your brain, which acts on your thyroid gland.

What is the thyroid?

The thyroid is a gland found in your neck. Its main function is to make hormones.

Hormones are chemicals which are released into your bloodstream. They act as messengers, affecting cells and tissues in distant parts of your body. Thyroid hormones affect your body’s metabolic rate and the levels of certain minerals in your blood.

What does the thyroid do?

The thyroid makes three hormones which it releases (secretes) into the bloodstream. Two of these hormones, called thyroxine (T4) and triiodothyronine (T3), increase your body’s metabolic rate. The other hormone helps to control the amount of calcium in the blood.

In order to make T4 and T3, your thyroid gland needs iodine, a substance found in the food we eat. T4 is called this because it contains four atoms of iodine. T3 contains three atoms of iodine. In the cells and tissues of your body most T4 is converted to T3. T3 is the more active hormone; it influences the activity of all the cells and tissues of your body.

How does the thyroid work?

The main job of your thyroid gland is to produce hormones T4 and T3. To do this your thyroid gland has to take a form of iodine from your bloodstream into your thyroid gland itself. This substance then undergoes a number of different chemical reactions which result in the production of T3 and T4.
The activity of your thyroid is controlled by chemicals (hormones) produced by two parts of your brain: the hypothalamus and the pituitary. Your hypothalamus receives input from your body about the state of many different bodily functions. When your hypothalamus senses levels of T3 and T4 are low, or that your body's metabolic rate is low, it releases a hormone called thyrotropin-releasing hormone (TRH). TRH travels to your pituitary via your connecting blood vessels. TRH stimulates your pituitary to secrete thyroid-stimulating hormone (TSH).

TSH is released from your pituitary into your bloodstream and travels to your thyroid gland. Here TSH causes cells within your thyroid to make more T3 and T4. T3 and T4 are then released into your bloodstream where they increase metabolic activity in your body's cells.

High levels of T3 stop your hypothalamus and pituitary from releasing (secreting) more of their hormones. In turn this stops your thyroid producing T3 and T4. This system ensures that T3 and T4 should only be made when their levels are too low.

See separate leaflet called The Thyroid and Parathyroid Glands for more details.
How do thyroid function tests work?

There are several different types of thyroid function tests which may be carried out. Interpreting all the different tests is complicated as there are various conditions which can change the level of these chemicals (hormones). A rough guide to the different types of tests and their interpretation is given below. However, your doctor or specialist doctor should explain individual test results.

Usually the first test to check thyroid function measures the levels of TSH in your blood. In people with an underactive thyroid (hypothyroidism) the amount of TSH will usually be high. This is usually because the thyroid is not making enough T3 to stop the pituitary producing TSH. If the level of TSH is high, you will usually have further tests to check the levels of T3 and T4 in the blood.

In people with an overactive thyroid (hyperthyroidism) the level of TSH will usually be low. This is usually because the thyroid gland is making too much of its hormones. When levels of T3 and T4 are high, the pituitary is 'turned off' and the amount of TSH produced is less. If you are found to have low levels of TSH you may have some more blood tests to check the levels of T3 and T4 in the blood. These tests may help doctors to find a specific cause of the low TSH.

What are thyroid function tests used for?

Thyroid function tests are usually done to find out whether the thyroid gland is working properly. This is mainly to diagnose an underactive thyroid (hypothyroidism) and an overactive thyroid (hyperthyroidism).

People with some conditions have an increased risk of thyroid problems and so are often advised to have thyroid function tests undertaken each year. This conditions include:

- Type 1 diabetes
- Coeliac disease
- Addison's disease
- Down's syndrome
- Turner syndrome

Certain drugs can also affect the function of your thyroid - for example, amiodarone and lithium.

Thyroid function tests can also be done to:

- Monitor treatment with thyroid replacement medicine for people who have hypothyroidism.
- Check thyroid gland function in people who are being treated for hyperthyroidism.
- Screen newborn babies for inherited problems with the thyroid.

What happens during a thyroid function test?

A thyroid function test is a simple blood test. The blood sample is then sent to the laboratory for analysis and the results are sent back to the doctor who asked for the tests.

What should I do to prepare for a thyroid function test?

Thyroid function tests usually require very little preparation. Tell your doctor if you are taking any medication, as some medicines can alter the test results and how they are interpreted. It is also important to mention if you have had any X-ray tests that have used a special contrast dye, as this may contain iodine which can affect the results. Levels of thyroid chemicals (hormones) also change in pregnancy, so tell your doctor if you are pregnant when the test is taken.

Note: all newborn children have their thyroid function tested as part of the heel prick test which is offered to all babies and undertaken when they are 5 days old. See separate leaflet called Newborn Baby Screening Tests for more information.