TEST

Thyroid function tests

Blood tests that measure thyroid hormones and the signals controlling their production.

WHAT IT MEASURES
TSH and thyroid hormones in blood

SAMPLE
Blood from a vein

FASTING NEEDED?
No, unless fasting for other tests

HOW LONG IT TAKES
Usually 5 to 10 minutes

RESULTS IN
Usually 1 to 2 days; laboratory timing differs

USED FOR
Screening, diagnosis, and monitoring thyroid function

MAIN LIMITATION
Illness, pregnancy, medicines, and assay interference can mislead

Overview

Thyroid function tests are blood tests that show how well your thyroid gland is working. The thyroid is a small gland in the front of your neck. It produces hormones that affect energy use, temperature, heart rate, digestion, and many other body functions.

The main tests are:

TSH is often tested first. Free T4 is usually added when TSH is outside the laboratory range or when a pituitary problem is possible. Free T3 is most useful when an overactive thyroid is suspected.

Other blood tests can look for thyroid antibodies. These help assess autoimmune conditions, in which the immune system reacts against the thyroid, but they do not directly measure thyroid function.

- TSH: Thyroid-stimulating hormone, made by the pituitary gland in the brain
- Free T4: The available form of thyroxine, the main hormone made by the thyroid
- Free T3: The available form of triiodothyronine, a more active thyroid hormone

Why the test is ordered

Thyroid function tests can help investigate symptoms that might be linked to too little or too much thyroid hormone. Such symptoms have many other possible causes, so the blood results must be considered alongside your medical history and examination.

Testing may also be used to:

A thyroid blood test cannot show the thyroid's shape or structure. An ultrasound or another test may be needed for that.

- Check an enlarged thyroid or a thyroid lump
- Investigate menstrual, fertility, growth, heart rhythm, or cholesterol concerns
- Monitor known thyroid or pituitary disease
- Check how thyroid treatment is working
- Assess thyroid function during pregnancy
- Follow up a previous abnormal result
- Monitor medicines that can affect the thyroid

Who should have the test

You may be offered testing if you have symptoms or examination findings that could relate to thyroid function. Testing may also be appropriate if you have another autoimmune condition, pituitary disease, previous thyroid treatment, or a strong family history.

Pregnancy changes thyroid hormone levels. Testing may be recommended before or during pregnancy when there are symptoms, previous thyroid disease, or other relevant risk factors.

Recommendations about testing people without symptoms differ between health systems and age groups. Whether screening is useful depends on your circumstances rather than on one rule for everyone. Newborn thyroid screening is a separate routine screening programme.

How to prepare

You usually do not need to fast. You can generally eat, drink water, and have coffee unless you are also having another test that requires fasting.

Tell the person arranging the test about prescription medicines, over-the-counter products, vitamins, and supplements. In particular, biotin-sometimes labelled vitamin B7 or included in

hair and nail supplements-can interfere with some thyroid tests.

Do not stop thyroid medicine, biotin, or any prescription medicine without instructions. If you take thyroid hormone, the timing of your dose can affect free T4. For monitoring, having each blood sample at a similar time in relation to your dose makes comparisons easier.

Mention pregnancy, recent serious illness, recent iodinated contrast used for a scan, and any recent change in thyroid treatment.

What happens during the test

A healthcare professional places a needle into a vein, usually inside your elbow or on the back of your hand. A small amount of blood is collected into one or more tubes.

The blood draw usually takes a few minutes. You can normally leave and continue your usual activities straight afterwards.

Understanding your results

Results should be interpreted using the ranges printed on your laboratory report. Ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, and clinical context.

The relationship between TSH and thyroid hormones is important. In someone with a normally functioning pituitary gland:

These patterns do not establish a diagnosis by themselves. A mildly abnormal result may be temporary, especially during or soon after an illness.

Thyroid antibody results need separate interpretation. A positive antibody test may support an autoimmune cause, but some people with antibodies have normal thyroid function. Antibody levels are not usually used to adjust a thyroid hormone dose.

- A high TSH with a low free T4 can support an underactive thyroid pattern
- A low TSH with a high free T4 or free T3 can support an overactive thyroid pattern
- An abnormal TSH with normal thyroid hormones may be called a subclinical pattern
- A low free T4 without a raised TSH may point to illness, medicine effects, or a pituitary problem

What affects the results

A result can be misleading even when the laboratory has performed the test correctly.

Biotin can cause falsely low TSH and falsely high free T4 or free T3 with some testing methods. The effect depends on the dose, timing, and laboratory assay.

Thyroid medicine timing matters. Free T4 may rise for several hours after taking levothyroxine. Missed doses followed by extra doses can also create a confusing pattern.

Other medicines may change hormone production, release, transport, or measurement. Examples include amiodarone, lithium, glucocorticoids, dopamine-related medicines, some seizure medicines, estrogen, and heparin. Do not stop them on your own.

Acute illness can temporarily lower or alter TSH, T3, and T4 without a primary thyroid disorder. Results taken during a hospital admission may therefore require later confirmation.

Pregnancy changes the proteins that carry thyroid hormones and can lower TSH, particularly early in pregnancy. Pregnancy-specific ranges are preferred when available.

Age and time of day can affect TSH. TSH follows a daily rhythm, although this usually makes little difference when results are clearly normal or abnormal.

Kidney or liver disease can alter thyroid hormone transport and metabolism. Iodine-containing medicines, supplements, or recent scan contrast may change thyroid activity.

Rarely, antibodies in your blood interfere with the laboratory method. This can produce results that do not fit your symptoms or other test findings.

Accuracy and limitations

For most people who are not acutely ill and have a normally functioning pituitary gland, TSH is a reliable first test. However, it can miss a thyroid hormone deficiency caused by pituitary or hypothalamic disease because TSH may be low, normal, or only slightly raised.

Temporary TSH changes can suggest a thyroid problem when there is none. Illness, pregnancy, medicine effects, and assay interference are important causes of these false alarms.

Free hormone tests are estimates affected by the testing method and hormone-binding proteins. If results conflict with each other or with your clinical picture, repeating the sample may help. A laboratory may use a different assay or a more specialised free T4 method. Imaging is better than blood tests for examining a lump or thyroid structure.

Risks and complications

A blood draw may cause a small bruise, brief soreness, or light-headedness. Serious

complications are uncommon.

What happens next

A result within range may need no further action, although follow-up can still be appropriate if symptoms continue or pituitary disease is suspected.

A mildly abnormal result is often repeated after an appropriate interval. Follow-up may include free T4, free T3, thyroid antibodies, a medicine review, or tests for another explanation. Known thyroid disease may require repeat testing after treatment changes.

Most abnormal thyroid results can be discussed through routine follow-up. Seek urgent medical care if you have severe breathing difficulty, chest pain, fainting, new confusion, a very fast or irregular heartbeat, or a high fever with marked agitation or drowsiness. These symptoms have many possible causes and should not be assessed using a thyroid result alone.

Common questions

Can I drink coffee before a thyroid blood test?

Usually, yes. Coffee does not normally prevent testing, but follow fasting instructions if other blood tests are being collected. If you take levothyroxine with coffee, discuss how to keep the timing of your medicine and blood draw consistent.

Does the time of day matter?

TSH changes naturally during the day. This is rarely important for an initial test, but similar collection times can make repeat results easier to compare.

Can I exercise beforehand?

Ordinary activity is unlikely to matter. Very strenuous exercise can temporarily affect several blood measurements, so avoiding an unusually intense workout beforehand may make results easier to interpret.

Should I take my thyroid medicine before the test?

Follow the instructions given with your test. Taking levothyroxine shortly before the blood draw can temporarily raise free T4. Consistent timing is especially important when monitoring treatment.

How long should I stop biotin before testing?

There is no single safe interval for every supplement and laboratory method. Tell the testing

service the product, dose, and time of your last dose, and follow its instructions rather than stopping it without advice.

Why are my results different from last time?

Small changes can reflect normal biological variation, a different laboratory method, dose timing, illness, pregnancy, or medicines. Larger or unexpected changes may need repeat or additional testing.

Sources

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