TEST

T3RU test

A T3RU blood test estimates how much thyroid-hormone-binding protein is available in your blood.

WHAT IT MEASURES
Available binding sites on proteins carrying thyroid hormones

SAMPLE
Blood

FASTING NEEDED?
No

HOW LONG IT TAKES
5 to 10 minutes

RESULTS IN
1 to 3 days, varying by laboratory

USED FOR
Diagnosis support alongside other thyroid tests

MAIN LIMITATION
Reflects binding proteins, not the blood's actual T3 level

Overview

The T3RU test is a blood test used to help interpret thyroid hormone results. The letters stand for "T3 resin uptake," the name of an older laboratory method.

Despite its name, the test does not directly measure the amount of T3 thyroid hormone in your blood. Instead, it estimates how many unoccupied binding sites are available on blood proteins that carry thyroid hormones.

Most thyroid hormone in the bloodstream is attached to proteins. The main carrier is thyroxine-binding globulin, often shortened to TBG. Only a small amount of thyroid hormone is unbound, or "free," and available for the body to use.

A T3RU result may be combined with a total T4 result to calculate a free thyroxine index, or FTI. This index estimates the amount of available T4 while allowing for changes in binding proteins.

Many laboratories now measure free T4 directly, so T3RU testing is used less often than it once was. However, it may still appear in some thyroid panels or be ordered when

binding-protein changes could make a total T4 result difficult to interpret.

Why the test is ordered

A clinician may order T3RU when a total T4 result does not fit your symptoms, thyroid-stimulating hormone result, or medical situation. Thyroid-stimulating hormone, usually called TSH, is the main test used to assess how the thyroid is being regulated.

T3RU may help distinguish a true thyroid hormone change from a change in the proteins carrying that hormone. For example, pregnancy and estrogen-containing medicines can increase TBG. This can raise total T4 even when the amount of free hormone remains appropriate.

The test may be used to:

T3RU is not usually used alone to screen for thyroid disease, diagnose a specific thyroid condition, or monitor treatment.

- Help interpret total T4 results
- Calculate a free thyroxine index
- Investigate possible changes in thyroid-binding proteins
- Clarify an older or unusual thyroid test pattern

Who should have the test

You may have this test if another thyroid result is unexpected or if your clinician suspects that pregnancy, illness, medicines, or an inherited protein difference is affecting your total thyroid hormone level.

It may also be included automatically in an older-style thyroid panel. If TSH and free T4 are available and reliable, a T3RU test may not add useful information.

The choice of test depends on your symptoms, medical history, pregnancy status, medicines, and previous results. Children and pregnant people need interpretation suited to their age or stage of pregnancy.

How to prepare

Fasting is not usually required. You can generally eat and drink normally before the blood draw.

Tell the person who ordered the test about prescription medicines, non-prescription medicines, hormones, and supplements. In particular, mention thyroid medicine, estrogen-containing contraception or hormone therapy, androgen or anabolic steroid use, anti-seizure medicines, and biotin supplements.

Biotin can interfere with some laboratory testing systems. Do not stop it or any prescribed medicine unless you have been given specific instructions. The laboratory or clinician can tell you whether your particular assay requires a pause.

If you take thyroid hormone, ask whether the sample should be collected before or after your usual dose. Consistent timing can make results easier to compare, especially when several thyroid tests are being performed together.

What happens during the test

A healthcare professional cleans an area of skin, usually inside your elbow, and places a needle into a vein. Blood is collected into a small tube.

The needle is removed, and pressure is applied to the site. The appointment usually takes 5 to 10 minutes, although the blood collection itself is often quicker.

The sample is sent to a laboratory. No radioactive material or T3 hormone is given to you; the "uptake" part of the test happens in the laboratory.

Understanding your results

T3RU may be reported as a percentage, ratio, or index. Reference ranges are method-specific, so use the range printed on your laboratory report.

A higher T3RU result usually means fewer thyroid-hormone-binding sites are available. This can happen when thyroid hormones occupy more sites, as may occur with an overactive thyroid, or when there is less binding protein.

A lower T3RU result usually means more binding sites are available. This can happen when thyroid hormone levels are lower or when binding proteins have increased.

The result cannot show which explanation is correct by itself. It must be interpreted with tests such as TSH and total T4. If a free thyroxine index is calculated, the laboratory combines total T4 with the T3RU measurement or a related ratio. Calculation methods can differ.

Ranges and interpretation vary by laboratory, age, sex, pregnancy status, medicines, and clinical context. A result outside the laboratory range does not automatically mean that your

thyroid is underactive or overactive.

What affects the results

T3RU is particularly sensitive to changes in thyroid-hormone-binding proteins. These changes can produce an abnormal result even when your thyroid gland is working normally.

Pregnancy and estrogen-containing medicines commonly increase TBG. This tends to produce a lower T3RU result and a higher total T4 result. The calculated free thyroxine index may remain within the expected range.

Androgens and anabolic steroids can reduce TBG and may raise T3RU. Inherited differences in TBG can also cause persistently high or low results without representing thyroid disease.

Kidney conditions that cause protein to be lost in urine, including nephrotic syndrome, may reduce binding proteins. Liver disease can increase or decrease protein production, depending on the condition and its severity.

Serious recent illness can alter thyroid hormone levels and their binding to proteins. Testing during an acute illness may therefore produce a pattern that does not reflect your usual thyroid function.

Some medicines can change TBG, displace thyroid hormones from their binding proteins, or affect thyroid hormone production. Examples include estrogen, androgens, thyroid medicines, some anti-seizure medicines, and high-dose salicylates. The effect depends on the medicine, dose, timing, and assay.

Biotin and uncommon antibodies in the blood can interfere with certain laboratory methods. This is an assay problem rather than a thyroid problem. A repeat test using a different method may help when results conflict strongly with other findings.

Routine meals, coffee, and normal daily activity have little direct effect on T3RU. There is no standard requirement to test at a particular time of day.

Accuracy and limitations

T3RU does not directly measure free T4, T3, TBG, or thyroid gland activity. It is an indirect estimate of available binding sites, so several different biological changes can produce the same result.

There is no single meaningful rate for how often T3RU misses thyroid disease or incorrectly suggests it. Performance depends on the laboratory method, the accompanying tests, and the

reason for testing. It should not be interpreted as a stand-alone positive or negative test.

It can appear abnormal when thyroid function is normal because binding proteins have changed. It can also appear unremarkable when offsetting changes in hormone levels and binding proteins mask one another. This is why TSH, total T4, free T4, symptoms, and medical history matter.

Direct free T4 testing is usually more useful for routine thyroid assessment. When ordinary free T4 methods are unreliable or results remain inconsistent, a specialist laboratory may use a more technically demanding method, such as equilibrium dialysis, to separate free hormone from protein-bound hormone.

Risks and complications

The risks are those of an ordinary blood draw. You may have brief discomfort, a small bruise, or feel faint; significant complications are uncommon.

What happens next

If the T3RU result fits your TSH, T4, medicines, and medical situation, no additional testing may be needed. If the results do not fit, the test may be repeated or followed by TSH, free T4, total T4, TBG, or another laboratory method.

An isolated abnormal T3RU result is generally handled through routine follow-up rather than emergency care. Do not change thyroid medicine, contraception, hormone therapy, or supplements solely because of this result.

Seek urgent medical assessment based on symptoms rather than the T3RU number. Severe chest pain, major difficulty breathing, fainting, or new confusion require urgent or emergency care regardless of a thyroid test result.

Common questions

Can I drink coffee before a T3RU test?

Usually, yes. Fasting is not normally required, and coffee does not have an important direct effect on T3RU. Follow any separate instructions if other fasting blood tests are being collected.

Does the time of day matter?

There is no standard time-of-day requirement for T3RU. If you take thyroid medicine, consistent timing in relation to your dose may help when comparing results.

Can I exercise beforehand?

Ordinary activity is unlikely to meaningfully alter the result. Very strenuous exercise can temporarily affect several blood tests and thyroid hormone patterns, so mention it if your results are unexpected.

Is T3RU the same as a T3 blood test?

No. A T3 blood test measures the hormone T3, either as total or free T3. T3RU estimates the availability of binding sites on thyroid-hormone-carrying proteins.

Do I need to stop biotin?

Some assays can be affected by biotin, but the risk depends on the laboratory method and amount taken. Ask for specific instructions rather than stopping a prescribed product on your own.

Why was T3RU ordered instead of free T4?

It may be part of an older thyroid panel or used with total T4 to estimate free hormone when binding-protein changes are suspected. The ordering clinician or laboratory can explain why it was selected in your case.

Sources

- Labcorp. T3 Uptake, test number 001156
- ARUP Consult. Analytical Considerations in the Evaluation of Thyroid Function
- Endotext. Assay of Thyroid Hormone and Related Substances
- MedlinePlus. Thyroid Tests
- US Food and Drug Administration. Biotin interference with certain laboratory tests
- Alexander EK, et al. 2017 American Thyroid Association Guidelines for Thyroid Disease During Pregnancy and the Postpartum