

Thyroxine, Free (FT4)

MDL Test Number: 617

Methodology: Immunoassay

CPT Codes: 84439 x 1



Specimen Collection Platform:

Serum in Serum Separator Tube (SST)

Turnaround Time:

24 - 72 hours

Stability:

Room temperature

Test Additions*:

30 days to add tests

Specimen Collection:



1. Immediately after blood collection, invert the tube(s) gently 5 times to ensure mixing of clot activator.



2. Allow the tube to rest upright for at least 30 minutes after collection to ensure proper clotting.



3. Centrifuge for at least 15 minutes at 2200-2500 RPM within one hour of collection.



4. Do not remove the stopper or pour off serum.



What is Free T4?

Thyroxine, usually shortened to T4, is the main hormone made by the thyroid gland in the front of the neck. Almost all of it travels through the blood attached to carrier proteins, which act as a reservoir and keep the supply steady. Only a very small fraction, well

under one percent, is unattached at any moment. That unattached fraction is what this test measures, and it is the part that actually matters: only free thyroxine can leave the bloodstream, enter tissues, and set the pace at which cells use energy.

Because carrier proteins hold the reserve rather than the working supply, the free level stays inside a narrow band even when the amount of carrier protein changes a great deal. That is the practical difference between this test and a total T4, which adds the carried and free portions together and therefore rises and falls with the carrier protein, whether or not the thyroid has changed. Free T4 is also measured directly here rather than calculated from a total T4. Like total T4, it does not swing through the day or across the menstrual cycle, so one adult range applies to women and men at every age.

Why test for Free T4?

A healthcare provider may order a free T4 test to measure the active, unattached portion of thyroxine in the blood. Common reasons include:

- **Confirming a thyroid problem and judging how far it has gone**, after a thyroid-stimulating hormone (TSH) result comes back outside the expected range
- **Checking thyroid function during pregnancy**, before conception, or in a fertility work-up, where carrier proteins are high, and a total T4 can be misleading
- **Sorting out symptoms that overlap heavily with gynecological ones**. Irregular, absent, or heavy periods, difficulty conceiving, recurrent pregnancy loss, fatigue, and weight change come from thyroid disease as readily as from a problem of the ovaries or uterus
- **Adjusting the dose for a patient taking thyroid hormone replacement**, where the aim is to land the level inside the expected range rather than above or below it
- **Investigating an overactive thyroid**, whether from Graves' disease or from a nodule or goiter that has begun producing hormone on its own
- **Evaluating a suspected problem of the pituitary gland**, where TSH alone can be normal or misleadingly low, even though the thyroid is underactive



A MEMBER OF GENESIS BIOTECHNOLOGY GROUP™

Medical Diagnostic Laboratories
www.mdlab.com • 877.269.0090



IH0354 Rel.: 9.2026

Special Instructions:

- **Pregnancy, estrogen, and hormonal contraceptives:** Estrogen raises the amount of carrier protein in the blood, which is why a total T4 can look high during pregnancy or on estrogen therapy while the thyroid is healthy. Free T4 largely does not follow that shift, which is one reason it is preferred in these situations. Patients should still say whether they are pregnant or taking estrogen, because in pregnancy thyroid results are judged against what is expected for that stage, rather than against the usual adult range.
- **Recent heparin treatment:** Heparin, a blood thinner given in hospitals and infusion clinics, affects free T4 both inside the body and in the sample itself. Blood should not be drawn during heparin treatment or soon after a dose, so patients should tell the ordering provider if they are receiving it.
- **Thyroid medication timing:** Thyroid hormone tablets are absorbed over the hours following a dose, so a sample drawn shortly after the morning tablet can read higher than the level the patient sits at for most of the day. Patients taking thyroid hormone should tell the laboratory when they last took it and keep that timing consistent from one test to the next.
- **Other medicines that can change the result:** Several medicines shift free T4 by loosening thyroxine from its carrier proteins or by speeding up how fast the body clears it. Phenytoin and large doses of aspirin or other salicylates are the ones seen most often. Patients should give the ordering provider a complete list of what they take, including over-the-counter products.
- **Comparing results over time:** Free T4 methods differ from one another more than most, and the same sample can give different numbers on different systems. When results are being tracked over time, use the same test at the same laboratory each time so the comparison is meaningful.

Limitations:

Every laboratory test has limits. For free T4, the main ones are:

- This test reports values between 0.3 and 6.0 nanograms per deciliter. A result above the top of that range is reported as greater than 6.0 rather than as an exact number. Levels in a severely overactive thyroid can rise past that point, so an exact figure may not be available at the start of treatment.
- Free T4 is far less affected by carrier proteins than total T4, but it is not entirely free of them. An uncommon inherited condition that changes how tightly albumin — a major blood protein — holds thyroxine can make a direct free T4 measurement misleading. So can antibodies against thyroxine itself, or other substances that interfere with hormone binding.
- When a patient is seriously ill from something unrelated to the thyroid, thyroid results become difficult to interpret because both the hormone level and the body's control of it shift during the illness. The manufacturer recommends a thyroid-stimulating hormone (TSH) measurement as a confirmatory test in that situation.
- A sample containing broken-down red blood cells (hemolysis) may have been mishandled somewhere between the draw and the laboratory, so results from such a sample are interpreted with caution. A heavily fatty sample needs additional processing before it can be measured.
- A small number of patients carry natural antibodies in their blood — often people who work closely with animals or who have received certain antibody-based treatments — that can interfere with the test and produce an unexpected result.
- A free T4 result is one piece of a larger picture. It is meant to be read together with the patient's symptoms, medical history, and other test results — never on its own.

Reference Range(s):

Free T4 is measured in nanograms per deciliter (ng/dL). One adult range covers women and men and does not shift with age, because the thyroid is not governed by sex hormones or by the reproductive cycle. The manufacturer publishes this range as the band seen when the thyroid is working normally, with results below it pointing toward an underactive thyroid and results at or above it toward an overactive one. The interval below is specific to serum, which is the sample type this laboratory reports:

- **Adults** (normal thyroid function, serum): **0.89–1.76 ng/dL (11.5–22.7 pmol/L)**

A result outside these ranges is not automatically a problem, and a result inside them does not rule one out. Only the ordering provider can interpret what a given number means for a given patient. Patients should always go by the reference range printed on their own laboratory report.

Analyte	Disorder	Expected Value*
Free T4	Hyperthyroidism (Graves' disease)	↑↑
Free T4	Toxic nodular goiter	↑
Free T4	Levothyroxine over-replacement	↑
Free T4	Underactive thyroid (Hashimoto)	↓
Free T4	Levothyroxine under-replacement	↓

*↓ – Decreased, ↑ – Increased, ↑↑ – Markedly Increased.

What are some references that discuss the medical necessity of testing Free T4?

1. Ross DS, et al. 2016 American Thyroid Association guidelines for diagnosis and management of hyperthyroidism and other causes of thyrotoxicosis. *Thyroid*, **26**, 1343–1421 (2016).
2. Chaker L, et al. Hypothyroidism. *Nat Rev Dis Primers*, **8**, 30 (2022).
3. Jonklaas J, et al. Guidelines for the treatment of hypothyroidism: prepared by the American Thyroid Association task force on thyroid hormone replacement. *Thyroid*, **24**, 1670–1751 (2014).
4. Korevaar T, et al. American Thyroid Association 2026 guidelines for thyroid disease in preconception, pregnancy, and postpartum. *Thyroid*, **36**, 481–544 (2026).
5. Krassas GE, et al. Thyroid function and human reproductive health. *Endocr Rev*, **31**, 702–755 (2010).



A MEMBER OF GENESIS BIOTECHNOLOGY GROUP™

Medical Diagnostic Laboratories
www.mdlab.com • 877.269.0090

