

Thyroid-stimulating Hormone (TSH)

MDL Test Number: 612

Methodology: Immunoassay

CPT Codes: 84443 x 1



Specimen Collection Platform:

Serum in Serum Separator Tube (SST)

Turnaround Time:

24 - 72 hours

Stability:

Room temperature

Test Additions*:

5 days to add tests



What is Thyroid-stimulating Hormone (TSH)?

Thyroid-stimulating hormone, or TSH, is a messenger hormone made by the pituitary gland, a small gland at the base of the brain that directs much of the body's hormone activity. TSH travels to the thyroid, a butterfly-shaped gland

in the front of the neck, and tells it to produce the thyroid hormones T4 and T3. Those hormones set the pace of the body's metabolism.

TSH is controlled by a feedback loop, and this is where the test surprises most people. Thyroid hormones signal back to the pituitary to ease off. When the thyroid is underactive and makes too little, that signal fades, the pituitary pushes harder, and TSH goes up. When the thyroid is overactive, the pituitary backs off and TSH goes down. The relationship runs in reverse: a high TSH usually means an underactive thyroid, and a low TSH usually means an overactive one.

The loop also amplifies. A small drift in thyroid hormone produces a large swing in TSH, which makes TSH the most sensitive single indicator of thyroid function and the recommended first test. It can flag a developing problem while T4 and T3 still look normal. That sensitivity is also why the reference range below is narrow.

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.

Why test for Thyroid-stimulating Hormone (TSH)?

TSH is the recommended first test for finding thyroid disease, sorting out its cause, and monitoring treatment.

- **Symptoms that suggest an underactive or overactive thyroid**, fatigue, weight change, sensitivity to cold or heat, hair loss, or palpitations
- **Menstrual irregularity, heavy periods, or absent periods (amenorrhea)**, since thyroid disease is a common and treatable cause
- **Difficulty conceiving or recurrent pregnancy loss**, where thyroid status is part of the standard workup
- **Before conception and during pregnancy**, when thyroid hormone requirements rise, and untreated thyroid disease carries risk for mother and baby
- **As part of the workup for polycystic ovary syndrome, also called polyendocrine metabolic ovarian syndrome (PMOS/PCOS)**, where thyroid disease has to be ruled out first
- **Finding thyroid disease early**, since TSH moves outside its range before T4 and T3 do
- **Checking whether a levothyroxine dose is right**, and following up after treatment for an overactive thyroid



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Special Instructions:

- **Wait about six weeks after a dose change:** After levothyroxine is started or adjusted, allow about six weeks before rechecking TSH. Testing sooner gives a number that has not caught up with the change.
- **Collect at a consistent time of day:** TSH follows a daily rhythm, so the time of the draw affects the result. For patients being followed over time, draw at roughly the same time of day, and use the same test at the same laboratory each time — different instruments produce somewhat different numbers from the same sample.
- **Pregnancy and preconception:** Thyroid hormone requirements rise early in pregnancy, and the targets used in pregnancy are not the same as the range on this sheet. Note pregnancy status, or that a patient is trying to conceive, on the requisition.
- **Record medications:** Several drugs change thyroid function or thyroid test results, among them amiodarone, lithium, steroid medications, dopamine, and iodine-containing contrast agents. Note current medications so the result can be read properly.
- **Biotin supplements:** Biotin (vitamin B7) is found in many over-the-counter hair, skin, and nail supplements. At high doses, it can make this result incorrect. Ask every patient about supplements and note biotin use on the requisition, since the draw may need to be deferred.
- **Tube type and sample quality:** Serum is required, and EDTA (lavender-top) plasma is not an acceptable sample for this test. Because tubes from different manufacturers can give different values, use a consistent tube type. Let the sample clot completely before spinning it, since leftover fibrin causes errors, and patients on blood thinners may need extra clotting time. Samples with high triglycerides need extra processing, and results from samples with broken-down red blood cells (hemolysis) should be read with caution.

Limitations:

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

- TSH does not rise when the problem lies in the pituitary rather than the thyroid. A TSH that is not high in a patient who appears clearly underactive should prompt a free T4 and a look at the pituitary.
- Serious illness unrelated to the thyroid can push TSH down, and levels rebound upward during recovery. Results drawn during or shortly after a severe illness are difficult to interpret.
- Results between 0.01 and 0.4 $\mu\text{IU/mL}$ need further evaluation. They may reflect a borderline overactive thyroid, severe illness unrelated to the thyroid, or recent drug treatment.
- 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 for TSH, these have been reported to read falsely high. Very rare inherited differences in the hormone itself may also affect how well it is detected.
- A TSH 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):

TSH is measured in micro-international units per milliliter ($\mu\text{IU/mL}$), also written as milli-international units per liter (mIU/L). The same range applies to adult women and men:

- **Adult** (normal thyroid function): **0.4 – 4.0 $\mu\text{IU/mL}$**

Remember that the relationship runs in reverse: a result above this range usually points to an underactive thyroid, and a result below it to an overactive one. Treatment targets are not always the same as this range — in pregnancy, and after surgery for thyroid cancer, a provider may deliberately aim for a different level. A result outside this range is not automatically a problem, and a result inside it 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*
TSH	Primary hypothyroidism (Hashimoto thyroiditis)	$\uparrow\uparrow$
TSH	Subclinical hypothyroidism	$\uparrow$
TSH	Central (pituitary) hypothyroidism	V
TSH	Subclinical hyperthyroidism	$\downarrow$
TSH	Hyperthyroidism (Graves' disease)	$\downarrow\downarrow$

*V – Variable, $\downarrow$ – Decreased, $\downarrow\downarrow$ – Markedly Decreased, $\uparrow$ – Increased, $\uparrow\uparrow$ – Markedly Increased.

What are some references that discuss the medical necessity of testing Thyroid-stimulating Hormones (TSH)?

1. Korevaar T, et al. American Thyroid Association 2026 guidelines for thyroid disease in preconception, pregnancy, and postpartum. *Thyroid*, **36**, 481–544 (2026).
2. 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).
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. Teede HJ, et al. Recommendations from the 2023 International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome. *J Clin Endocrinol Metab*, **108**, 2447–2469 (2023).
5. Practice Committee of the American Society for Reproductive Medicine. Current evaluation of amenorrhea: a committee opinion. *Fertil Steril*, **122**, 52–61 (2024).



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