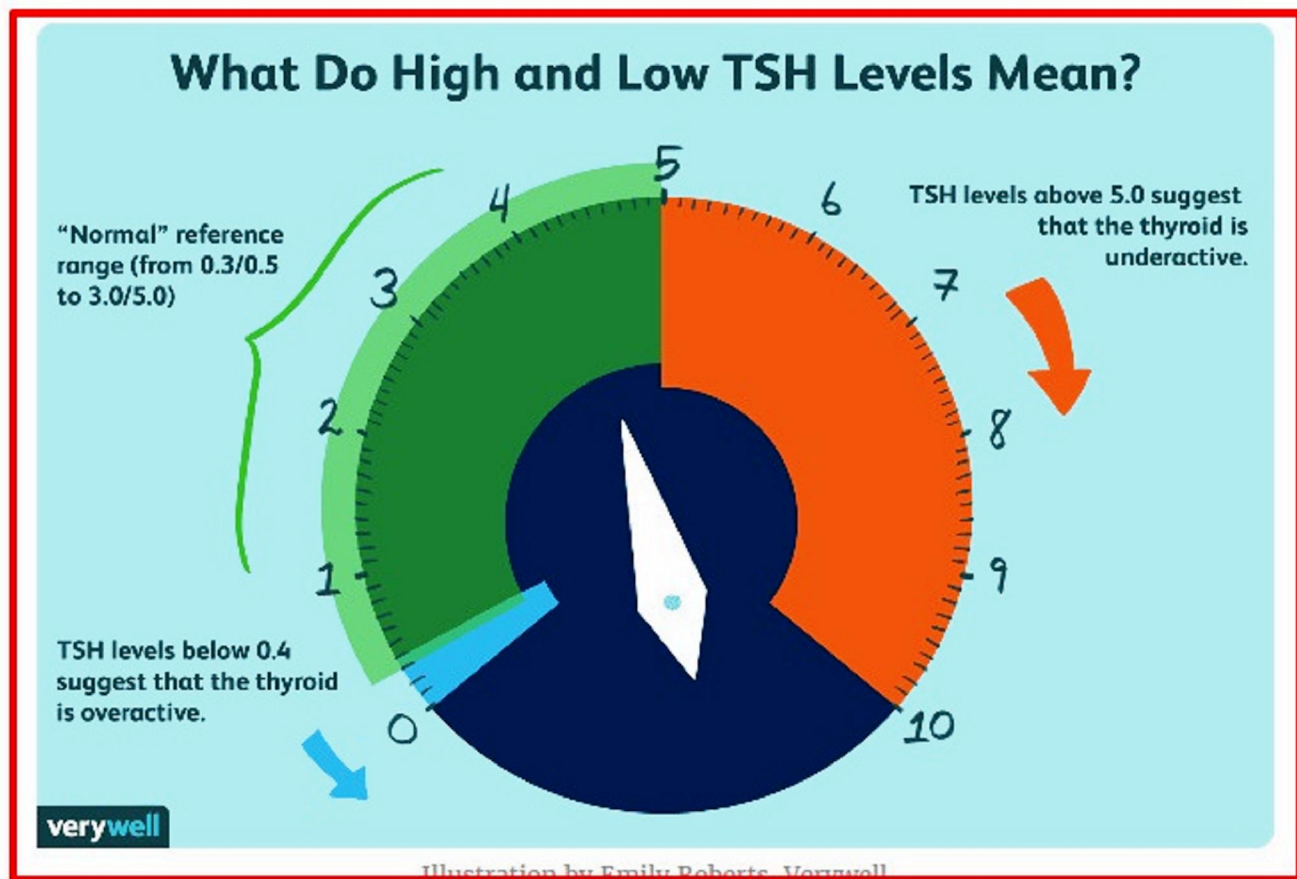


High and Low TSH Levels: What They Mean

Interpretations, Variations, and Controversies

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It's important to understand the meaning and possible causes of both high thyroid stimulating hormone (TSH) and low TSH, whether you have been living with [thyroid disease](#) for a long time or are only having the test to screen for a thyroid disorder. A high TSH level can mean a new diagnosis of hypothyroidism or inadequate thyroid replacement. A low TSH might mean hyperthyroidism or overtreatment of hypothyroidism. That said, there are exceptions to these interpretations, as well as what a "normal" level may be for you.



How TSH Levels Change

TSH levels are confusing and not necessarily intuitive. For example, many people question why high TSH levels can mean the thyroid is underactive and low TSH levels can mean it's overactive. Understanding exactly how the thyroid gland works can help.

Your [thyroid gland](#) produces thyroid hormone. When it functions properly, your thyroid is part of a feedback loop with your pituitary gland that involves several key steps:

1. First, your pituitary gland senses the level of thyroid hormone that is released into the bloodstream.

2. Your pituitary releases the special messenger hormone TSH, which stimulates the thyroid to release more thyroid hormone.
3. When your thyroid, for whatever reason— illness, stress, surgery, or obstruction, for example— doesn't or can't produce enough thyroid hormone, your pituitary detects the reduced levels of thyroid hormone and moves into action by making more TSH, which then triggers your thyroid to make more thyroid hormone. This is the pituitary's effort to raise the levels of thyroid hormone and return the system to normal.
4. If your thyroid is overactive and producing too much thyroid hormone— due to disease or taking [too high a dose of thyroid hormone](#) replacement drugs— your pituitary senses that there is too much of the hormone circulating and slows or shuts down TSH production. This drop in TSH is an attempt to return circulating thyroid hormone levels to normal.

Interpreting TSH Levels

Once you understand these thyroid basics, it's easier to understand what a low TSH and a high TSH reveal about your thyroid's function.

The normal range for TSH is between 0.5 mU/l and 5.0 mU/l.

- A **high TSH** suggests your thyroid is underactive ([hypothyroid](#)) and not doing its job of producing enough thyroid hormone.
- A **low TSH** suggests your thyroid is overactive ([hyperthyroid](#)) and producing excess thyroid hormone.

As with most medical conditions and tests, however, there are exceptions to this rule. It's also important to note that normal thyroid levels may be abnormal for *you*. For example, a TSH greater than 3.0 mU/l is abnormal in pregnancy.

Controversy Over Optimal TSH

While most laboratories define a normal TSH as between roughly 0.5 mU/l and 5.0 mU/l, some experts argue that the upper limit of a normal TSH should be lower (around 2.5 mIU/L) due to the fact that the vast majority of young adults without thyroid disease have a TSH value between 0.4 and 2.5 mIU/L. In addition, some physicians believe older patients should have a higher TSH (for example, greater than 4.0 mU/l or 5.0 mU/l) since TSH normally increases with age.

Some of this controversy can be averted by doctors simply looking at each person as an individual. For example, a person who still has significant [symptoms of hypothyroidism](#) at a TSH of 4.0 mU/l (especially someone who is young or middle-aged) may do better with a goal TSH of around 1.0 mU/l. In contrast, someone who has health risks (such as heart disease or osteoporosis) may benefit from having a goal TSH that is higher (perhaps 5.0 mU/l or 6.0 mU/l).

In pregnancy, TSH should not be allowed to rise above 3.0 mU/l for the health of both the baby and mother.

Causes of High TSH

A high TSH means different things depending on whether a person has known thyroid disease or not.

In People Without Thyroid Disease

A high TSH in people who are not undergoing thyroid disease treatment usually indicates the presence of peripheral hypothyroidism. This is by far the most common form of [hypothyroidism](#) and occurs because the

thyroid gland produces an inadequate amount of thyroid hormones. The pituitary gland will sense these low levels and increase production of TSH.

An elevated TSH may also occur with normal thyroid function due to the presence of antibodies and more.

In People Being Treated for Thyroid Disease

A high TSH may be found in people being treated for either hypo- or hyperthyroidism. With hypothyroidism, a high TSH usually means that the dose of thyroid hormone needs to be increased. In some cases, however, the dose is optimal, but the medication is not fully absorbed. (Many foods and medications can affect levothyroxine, and it's important to learn how to [properly take thyroid hormones](#).)

With hyperthyroidism, a high TSH usually means that the treatment (whether surgery, radioactive iodine, or medications) was effective in turning off the overproduction of thyroid hormone, and that a person has now become hypothyroid.

Causes of Low TSH Results

A low TSH often, but not always, means that a person has an elevated level of thyroid hormones.

In People Without Known Thyroid Disease

While often associated with hyperthyroidism, a low TSH could also be a sign of central hypothyroidism.

- [Hyperthyroidism](#): Hyperthyroidism can be transient and permanent and due to a number of causes ranging from autoimmune disease, to toxic nodules or goiters, to pregnancy-related thyroiditis.
- Central hypothyroidism: Less commonly, a lack of TSH produced by the pituitary gland (due to its dysfunction) can lead to low thyroid levels in the blood. While this is an exception to the general rule that hypothyroidism is associated with a high TSH, central hypothyroidism is uncommon and usually associated with a deficiency of other pituitary hormones (and subsequently, a number of other symptoms).

In People With Thyroid Disease

In people being treated for hypothyroidism, a low TSH level may mean:

- Overmedication with thyroid hormone replacement
- An optimal dose of medication, but interactions that cause increased absorption or activity
- Central hypothyroidism

In people being treated for hyperthyroidism, a low TSH level usually means that further treatment is needed to reduce thyroid hormone levels or that a person must continue to be monitored to make sure thyroid hormone levels return to normal (such as in cases of transient thyroiditis related to pregnancy or chemotherapy treatment).

Factors That May Affect Your TSH Results

There are a number of variations and factors that can affect TSH levels. It's important to be aware of these, as treatment that is dictated solely by lab values (as opposed to also considering an individual's symptoms) can result in an ineffective plan.

Laboratory Error

If a TSH level is surprising, sometimes simply repeating the test is the best course. Errors can occur during the blood draw, in transcribing the results, or due to mix-ups in the lab. Statistically, there is always a risk of lab error, and results should always be interpreted along with clinical symptoms and findings.

Antibodies

Antibodies are thought to interfere with accurate thyroid testing in roughly 1 percent of people. In a [2018 review](#), it was estimated that in people who have these antibodies, the interference with TSH testing caused either misdiagnosis or inappropriate treatment in more than 50 percent of cases:

- **Heterophile antibodies:** Heterophile antibodies are antibodies that may occur when a person is exposed to animal-derived pharmaceuticals and antibody therapies. Their presence is more common in people who have had certain vaccinations, blood transfusions, or have been exposed to some animals (not household pets). The estimated incidence of these antibodies varies widely, but when present, they can interfere with TSH levels. There is no easy way to know if you have these antibodies, but a discrepancy between TSH levels and free T4 (the hallmark of heterophile antibodies), or between TSH levels and how you feel, should raise the question.
- **Thyroid antibodies:** [Thyroid autoantibodies](#), present in some people with or without a thyroid condition, may also affect TSH levels. Again, a discrepancy between lab values and how you feel should raise the question of whether or not the test is accurate.
- **Other antibodies:** Other antibodies important in TSH testing interference include anti-ruthenium antibodies and anti-streptavidin antibodies.

Other Factors

A number of other [factors can affect TSH test results](#) either through having an effect on actual levels of thyroid hormones or interacting with testing measures. Some of these include:

- The time of day that the test is done: TSH levels are higher if you're tested after fasting (for example, in the morning after not having eaten since the night before) as compared to after eating later in the day.
- Illness
- Pregnancy
- Some medications that are used for heart disease and in cancer treatment
- Foods or supplements rich in/derived from iodine or kelp
- Biotin supplements
- Non-steroidal anti-inflammatory medications such as Advil (ibuprofen)
- Changes in sleep habits

In order to get the most accurate results, it's important to be consistent. For example, always having your test done at the same time of day.

Capillary Fingerprick Tests

A somewhat controversial test available some places uses fingerprick rather than venous blood draw samples to evaluate thyroid function. Proponents of this testing, also called a blood spot test, believe that this testing prevents the breakdown of TSH during the time between when blood is drawn and when it is that could lead to erroneous results. Since the test is not currently widely available, it's unknown exactly how well the test compares with conventional TSH testing.

When TSH Alone is Not Enough

During diagnosis, most doctors use the TSH test to evaluate thyroid function and determine the optimal course of treatment. There are times, however, when a TSH is or may be insufficient.

For instance, free T4 in addition to TSH is usually tested if a doctor suspects thyroid dysfunction arising from disease of the pituitary gland or hypothalamus. Likewise, if the TSH is normal, but a person still has symptoms of being hyperthyroid or hypothyroid, free T4 may be checked.

TSH is also not necessarily sufficient to monitor [hypothyroidism during pregnancy](#), and a T4 and free T4 are often recommended. Depending on the clinical situation, [other thyroid tests](#) that may be evaluated include triiodothyronine (T3), free T3, [reverse T3](#), and thyroid antibody tests.

A Word From Verywell

The TSH test is the "gold standard" in diagnosing and monitoring thyroid disease, but as with any medical test, there are exceptions and variations to what the test may mean, as well as situations in which the test may be inaccurate. If your TSH levels don't seem to reflect how you are feeling, speak up. Even a "normal" TSH may be abnormal for you.