

# Hypothyroidism

National Endocrine and Metabolic Diseases Information Service



U.S. Department  
of Health and  
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NATIONAL  
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## What is hypothyroidism?

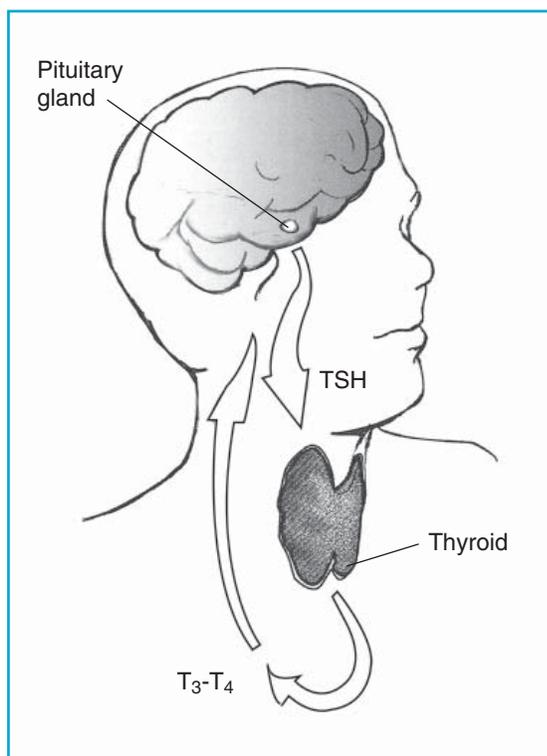
Hypothyroidism occurs when the thyroid gland does not produce enough thyroid hormone to meet the body's needs. Without enough thyroid hormone, many of the body's functions slow down. About 5 percent of the U.S. population has hypothyroidism.<sup>1</sup> Women are much more likely than men to develop hypothyroidism.

## What is the thyroid gland?

The thyroid is a 2-inch-long, butterfly-shaped gland weighing less than an ounce. It is located in the front of the neck below the larynx, or voice box, and comprises two lobes, one on either side of the windpipe. The thyroid is one of a group of glands that are part of the endocrine system. The endocrine glands produce, store, and release hormones into the bloodstream that travel through the body and direct the activity of the body's cells. Thyroid hormones regulate metabolism, which is the way the body uses energy, and affect nearly every organ in the body.

The thyroid gland makes two thyroid hormones, triiodothyronine (T<sub>3</sub>) and thyroxine (T<sub>4</sub>). Thyroid hormones affect metabolism, brain development, breathing, heart and nervous system functions, body temperature, muscle strength, skin dryness, menstrual cycles, weight, and cholesterol levels. A

<sup>1</sup>Orlander PR, Woodhouse WR, Davis AB. Hypothyroidism. Available at: [www.emedicine.com/med/topic1145.htm](http://www.emedicine.com/med/topic1145.htm). Updated September 23, 2005. Accessed July 7, 2006.



The thyroid gland's production of thyroid hormones (T<sub>3</sub> and T<sub>4</sub>) is triggered by thyroid-stimulating hormone (TSH), which is made by the pituitary gland.

third hormone produced by specialized cells in the thyroid gland, calcitonin, affects calcium levels in the blood and the buildup of calcium in the bones. Calcitonin is not considered a thyroid hormone *per se*.

Thyroid hormone production is regulated by thyroid-stimulating hormone (TSH), which is made by the pituitary gland. Located in the brain, the pituitary gland is the "master gland" of the endocrine system.

## What causes hypothyroidism?

Hypothyroidism has several causes, including

- Hashimoto’s disease
- thyroiditis, or inflammation of the thyroid gland
- congenital hypothyroidism, or hypothyroidism that is present at birth
- surgical removal of part or all of the thyroid gland
- radiation treatment of the thyroid
- some medications

Less commonly, hypothyroidism is caused by too much or too little iodine in the diet or by abnormalities of the pituitary gland.

### Hashimoto’s Disease

Hashimoto’s disease, also called chronic lymphocytic thyroiditis, is the most common cause of hypothyroidism in the United States. Hashimoto’s disease is an autoimmune disorder, which means the body’s immune system, which normally protects the body by attacking foreign organisms, acts against its own healthy cells and tissues. In Hashimoto’s disease, the immune system makes antibodies that attack cells in the thyroid and interfere with their ability to produce thyroid hormone.

## Thyroiditis

Thyroiditis causes stored thyroid hormone to leak out of the inflamed thyroid gland. At first, the leakage raises hormone levels in the blood, leading to hyperthyroidism that lasts for a month or two. Most people then develop hypothyroidism before the thyroid is completely healed. Several types of thyroiditis can lead to hypothyroidism:

- **Subacute thyroiditis.** This condition involves painful inflammation and enlargement of the thyroid. Doctors aren’t sure what causes subacute thyroiditis, but it may be related to a viral or bacterial infection. The condition usually goes away on its own in a few months.
- **Postpartum thyroiditis.** About 8 percent of women who have been pregnant develop postpartum thyroiditis within a few months of giving birth.<sup>2</sup> In some women, the thyroid does not heal and their hypothyroidism is permanent. Postpartum thyroiditis is believed to be an autoimmune condition.
- **Silent thyroiditis.** This type of thyroiditis is called “silent” because it is painless, as is postpartum thyroiditis, even though the thyroid may be enlarged. Silent thyroiditis is probably an autoimmune condition and sometimes develops into permanent hypothyroidism.

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<sup>2</sup>Nicholson WK, Robinson KA, Smallridge RC, Ladenson PW, Powe NR. Prevalence of postpartum thyroid dysfunction: a quantitative review. *Thyroid*. 2006;16(6):573–582.

## **Congenital Hypothyroidism**

Some babies are born with a thyroid that is not fully developed or does not function properly. If untreated, congenital hypothyroidism can lead to mental retardation and growth failure. Most newborns in the United States are screened for hypothyroidism, and early treatment can prevent these complications.

## **Surgical Removal of the Thyroid**

Part or all of the thyroid gland may be surgically removed as a treatment for

- hyperthyroidism, when the thyroid makes too much thyroid hormone
- a large goiter, which is an enlarged thyroid gland that may cause the neck to appear swollen and can interfere with normal breathing and swallowing
- thyroid nodules, which are lumps in the thyroid that can produce excess thyroid hormone
- thyroid cancer

When part of the thyroid is removed, the remaining part may produce normal amounts of thyroid hormone, but some people who have this surgery develop hypothyroidism. Removal of the entire thyroid always results in hypothyroidism.

## **Radiation Treatment of the Thyroid**

Radioactive iodine, a common treatment for hyperthyroidism, gradually destroys the cells of the thyroid. Almost everyone who receives radioactive iodine treatment eventually develops hypothyroidism. People with Hodgkin's disease, other lymphomas, and head or neck cancers are treated with radiation, which can also damage the thyroid.

## **Medications**

Some drugs can interfere with thyroid hormone production and lead to hypothyroidism. These drugs include

- amiodarone, a heart medication
- interferon alpha, a cancer medication
- lithium, a bipolar disorder medication
- interleukin-2, a kidney cancer medication

## What are the symptoms of hypothyroidism?

Hypothyroidism has many symptoms that can vary from person to person. Some common symptoms of hypothyroidism are

- fatigue
- weight gain
- puffy face
- cold intolerance
- joint and muscle pain
- constipation
- dry, thinning hair
- decreased sweating
- heavy or irregular menstrual periods and impaired fertility
- depression
- slowed heart rate

Symptoms more specific to Hashimoto's disease are goiter and a feeling of fullness in the throat.

Hypothyroidism can contribute to high cholesterol. People with high cholesterol should be tested for hypothyroidism. Rarely, severe untreated hypothyroidism may lead to myxedema coma, an extreme form of hypothyroidism in which the body slows to the point that it becomes life-threatening. Myxedema requires immediate medical treatment.

## Who is likely to develop hypothyroidism?

Women are much more likely than men to develop hypothyroidism. The disease is also more common among people older than age 60. The American Thyroid Association recommends that adults, particularly women, have a blood test to detect thyroid problems every 5 years starting at age 35.

Certain factors can increase a person's chances of developing thyroid disorders. Individuals may need more regular testing if they

- have had a thyroid problem before, such as goiter or thyroid surgery
- have a family history of thyroid disease
- have other autoimmune diseases including Sjögren's syndrome, pernicious anemia, type 1 diabetes, rheumatoid arthritis, or lupus
- have Turner syndrome, a genetic disorder that affects girls and women
- are older than 60
- have been pregnant or delivered a baby within the past 6 months
- have received radiation to the thyroid or to the neck or chest

Getting tested routinely helps uncover thyroid problems—especially subclinical problems. Subclinical means a person has no apparent symptoms. Some doctors treat subclinical hypothyroidism immediately; others prefer to leave it untreated but monitor their patients for signs that the condition is worsening.

## How is hypothyroidism diagnosed?

Many symptoms of hypothyroidism can occur in other diseases, so hypothyroidism usually cannot be diagnosed based on symptoms alone. Health care providers take a medical history and perform a thorough physical examination. Providers may then use several tests to confirm a diagnosis of hypothyroidism and find its cause.

### Thyroid-stimulating Hormone (TSH) Test

The ultrasensitive TSH test is usually the first test a doctor performs. This test is the most accurate measure of thyroid activity available.

The TSH test is based on the way TSH and thyroid hormone work together. The pituitary gland boosts TSH production when the thyroid is not making enough thyroid hormone; the thyroid normally responds to TSH by making more hormone. Then, when the body has enough thyroid hormone circulating in the blood, TSH output drops. In people who produce too little thyroid hormone, the pituitary makes TSH continuously, trying to get the thyroid to produce more thyroid hormone.

Generally, a TSH reading above normal means a person has hypothyroidism and a reading below normal means a person has hyperthyroidism.

### Other Tests

Health care providers may conduct additional tests to help confirm the diagnosis or determine the cause of hypothyroidism.

The T<sub>4</sub> test measures the actual amount of circulating thyroid hormone in the blood. In hypothyroidism, the level of T<sub>4</sub> in the blood is lower than normal.

The thyroid autoantibody test looks for the presence of thyroid autoantibodies. Most people with Hashimoto's disease have these antibodies, but people whose hypothyroidism is caused by other conditions do not.

## Pregnancy and Hypothyroidism

Women with hypothyroidism should discuss their condition with their doctor before becoming pregnant. Uncontrolled hypothyroidism raises the chance of miscarriage, preterm delivery, and preeclampsia, which is a potentially serious complication that increases blood pressure. Untreated hypothyroidism during pregnancy may also affect the baby's growth and brain development. Thyroid medications can help prevent these problems and are safe to take during pregnancy.

Postpartum thyroiditis sometimes goes undiagnosed because the symptoms are mistaken for postpartum blues: the exhaustion and moodiness that sometimes follow delivery. Women whose symptoms do not go away within 6 months should talk with their doctor.

## How is hypothyroidism treated?

Hypothyroidism is treated with synthetic thyroxine, which is identical to the T<sub>4</sub> made by the thyroid. The exact dose will depend on the patient's age and weight, the severity of the hypothyroidism, the presence of other health problems, and whether the person is taking other drugs that might interfere with how well the body uses thyroid hormone.

Health care providers test TSH levels about 6 to 8 weeks after a patient begins taking thyroid hormone and make any necessary adjustments to the dose. Each time the dose is adjusted, the blood is tested again. Once a stable dose is reached, blood tests are normally repeated in 6 months and then once a year after that.

Hypothyroidism can almost always be completely controlled with synthetic thyroxine, as long as the recommended dose is taken every day as instructed.

## Points to Remember

- Hypothyroidism occurs when the thyroid gland does not produce enough thyroid hormone, which regulates metabolism, and many of the body's functions slow down.
- Hypothyroidism is most often caused by Hashimoto's disease, an autoimmune disorder, and usually affects women. Other causes include inflammation of the thyroid gland, treatments for hyperthyroidism—too much thyroid hormone—or other thyroid problems, and certain medications.
- Some symptoms of hypothyroidism are fatigue, weight gain, cold intolerance, constipation, impaired fertility, and depression.
- Hypothyroidism is easily treated with synthetic thyroid hormone.

## Hope through Research

Researchers are investigating the development, signs and symptoms, and genetics of thyroid function disorders to further understand thyroid diseases. Scientists continue to study treatment options for hypothyroidism and other thyroid disorders. For information about current studies, see [www.ClinicalTrials.gov](http://www.ClinicalTrials.gov).

## For More Information

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### **American Thyroid Association**

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### **The Endocrine Society**

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### **The Thyroid Foundation of America**

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