

## What is hyperthyroidism?

Hyperthyroidism develops when the body is exposed to excessive amounts of thyroid hormone. This disorder occurs in almost 1% of all Americans and affects women 5 to 10 times more often than men. In its mildest form, hyperthyroidism may not cause recognizable symptoms. More often, however, the symptoms are discomforting, disabling, or even life threatening.

## What are the symptoms of hyperthyroidism?

When hyperthyroidism develops, a goiter (enlargement of the thyroid) is usually present and may be associated with some or many of the following symptoms:

- Fast heart rate, often more than 100 beats per minute
- Nervousness, anxiety, or an irritable and quarrelsome feeling
- Trembling hands
- Weight loss, despite eating the same amount or even more than usual
- Intolerance of warm temperatures and increased likelihood to perspire
- Loss of scalp hair
- Rapid growth of fingernails and tendency of fingernails to separate from the nail bed
- Muscle weakness, especially of the upper arms and thighs
- Loose and frequent bowel movements
- Thin and delicate skin
- Change in menstrual pattern
- Increased likelihood for miscarriage
- Prominent “stare” of the eyes
- Protrusion of the eyes, with or without double vision (in patients with Graves’ disease)
- Irregular heart rhythm, especially in patient older than 60 years of age
- Accelerated loss of calcium from bones, which increases the risk of osteoporosis and fractures

## What are the causes of hyperthyroidism?

### Graves’ disease

Graves’ disease (named after Irish physician Robert Graves) is an autoimmune disorder that frequently results in thyroid enlargement and hyperthyroidism. In a minority of patients, swelling of the muscles and other tissues around the eyes may develop, causing eye prominence, discomfort or double vision. Like other autoimmune diseases, this condition tends to affect multiple family members. It is much more common in women than in men, and tends to occur in younger patients.

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### Toxic multinodular goiter

Multiple nodules in the thyroid can produce excessive thyroid hormone, causing hyperthyroidism. Often diagnosed in patients over the age of 50, this disorder is more likely to affect heart rhythm. In many cases, the person has had the goiter for many years before it becomes overactive.

### Toxic nodule

A single nodule or lump in the thyroid can also produce more thyroid hormone than the body requires and lead to hyperthyroidism. This disorder is not familial.

### Subacute thyroiditis

This condition of unknown cause is characterized by painful thyroid gland enlargement and inflammation, which results in the release of large amounts of thyroid hormones into the blood. Fortunately, this condition usually resolves spontaneously. The thyroid usually heals itself over several months, but often not before a temporary period of low thyroid hormone production (hypothyroidism) occurs.

### Postpartum thyroiditis

5% to 10% of women develop mild to moderate hyperthyroidism within several months of giving birth. Hyperthyroidism in this condition usually lasts for approximately 1-2 months. It is often followed by several months of hypothyroidism, but most women will recover normal thyroid function eventually. In some cases, however, the thyroid gland does not heal, so the hypothyroidism becomes permanent and requires lifelong thyroid hormone replacement.

### Silent thyroiditis

Transient (temporary) hyperthyroidism can be caused by silent thyroiditis, a condition which appears to be the same as postpartum thyroiditis but not related to pregnancy. It is not accompanied by a painful thyroid gland.

### Excessive iodine ingestion

Various sources of high iodine concentrations, such as kelp tablets, some expectorants, amiodarone (Cordarone, Pacerone - a medication used to treat certain problems with heart rhythms) and x-ray dyes, may occasionally cause hyperthyroidism in certain patients.

### Over medication with thyroid hormone

Patients who receive excessive thyroxine replacement treatment can develop hyperthyroidism. They should have their thyroid hormone dosage evaluated by a physician at least once each year and should NEVER give themselves “extra” doses.

## How is hyperthyroidism diagnosed?

Characteristic symptoms and physical signs of hyperthyroidism can be detected by a physician. In addition, tests can be used to confirm the diagnosis and to determine the cause.

### TSH (thyroid-stimulating hormone or thyrotropin) test

A low TSH level in the blood is the most accurate indicator of hyperthyroidism. The body shuts off production of this pituitary hormone when the thyroid gland even slightly overproduces thyroid hormone. If the TSH level is low, it is very important to also check thyroid hormone levels to confirm the diagnosis of hyperthyroidism

### Other tests

- Free T4 (thyroxine) and Free T3 (triiodothyronine) - the active thyroid hormones in the blood. When hyperthyroidism develops, free T4 and T3 levels rise above previous values in that specific patient (although they may still fall within the normal range for the general population), and are often considerably elevated.
- TSI (thyroid-stimulating immunoglobulin) - a substance often found in the blood when Graves’ disease is the cause of hyperthyroidism. This test is ordered infrequently, since it rarely affects treatment decisions.
- Radioactive iodine uptake (RAIU - a measurement of how much iodine the thyroid gland can collect) and thyroid scan (a thyroid scan shows how the iodine is distributed throughout the thyroid gland). This information can be useful in determining the cause of hyperthyroidism and ultimately its treatment.

Sometimes a general physician can diagnose and treat the cause of hyperthyroidism, but assistance is

often needed from an endocrinologist, a physician who specializes in managing thyroid disease.

## How is hyperthyroidism treated?

Before the development of current treatment options, the death rate from hyperthyroidism was as high as 50%. Now several effective treatments are available, and with proper management, death from hyperthyroidism is rare. Deciding which treatment is best depends on what caused the hyperthyroidism, its severity, and other conditions present. A physician who is experienced in the management of thyroid diseases can confidently diagnose the cause of hyperthyroidism and prescribe and manage the best treatment program for each patient.

### Antithyroid drugs

In the United States, 2 drugs are available for treating hyperthyroidism: propylthiouracil (PTU) and methimazole (Tapazole). These medications control hyperthyroidism by slowing thyroid hormone production, and are frequently used for several months after the initial diagnosis of hyperthyroidism to normalize the thyroid hormone levels. Some patients with hyperthyroidism caused by Graves disease experience a spontaneous or natural remission of hyperthyroidism after a 12 to 18 month course of treatment with these drugs, and may sometimes avoid permanent underactivity of the thyroid (hypothyroidism), which often occurs as a result of using the other methods of treating hyperthyroidism.



Unfortunately, the remission is frequently only temporary, with the hyperthyroidism recurring after several months or years off medication and requiring additional treatment, so relatively few patients are treated solely with antithyroid medication in the United States.

# Hyperthyroidism

Antithyroid drugs may cause an allergic reaction in about 5% of patients who use them. This usually occurs during the first 6 weeks of drug treatment. Such a reaction may include rash, hives, fever, or joint pain, but after discontinuing use of the drug, the symptoms resolve within 1 - 2 weeks, and there is no permanent damage.

A more serious effect, but occurring in only about 1 in 250-500 patients during the first 4 to 8 weeks of treatment, is a rapid decrease of white blood cells in the bloodstream. This could increase susceptibility to serious infection. Symptoms such as a sore throat, joint aches, infection, or fever should be reported promptly to your physician, and a blood cell count should be done immediately. In nearly every case, when a person stops using the medication, the white blood cell count returns to normal.

*Very rarely, antithyroid drugs may cause liver problems, which can be detected by monitoring blood tests. Your physician should be contacted if there is yellowing of the skin (“jaundice”), fever, loss of appetite, or abdominal pain.*

## Radioactive iodine treatment

Iodine is an essential ingredient in the production of thyroid hormone. Each molecule of thyroid hormone contains either 4 (T4) or 3 (T3) molecules of iodine. Since most overactive thyroid glands are quite hungry for iodine, it was discovered in the 1940's that the thyroid could be “tricked” into destroying itself by simply feeding it radioactive iodine. The radioactive iodine is given by mouth, usually in capsule form, and is quickly absorbed from the bowel. It then enters the thyroid cells from the bloodstream and gradually destroys them. Maximal benefit is usually noted within 3 to 6 months.

It is not possible to reliably eliminate “just the right amount” of the diseased thyroid gland, since the effects of the radioiodine are slowly progressive on the thyroid cells. Therefore, most endocrinologists strive to completely destroy the diseased thyroid gland with a single dose of radioiodine. This results

in the intentional development of an underactive thyroid state (hypothyroidism), which is easily, predictably and inexpensively corrected by lifelong daily use of oral thyroid hormone replacement therapy. Although every effort is made to calculate the correct dose of radioiodine for each patient, not every treatment will successfully correct the hyperthyroidism, particularly if the goiter is quite large, and a second dose of radioactive iodine is occasionally needed.

In the 50+ years and hundreds of thousands of patients (including a former President of the United States and his wife!) in which radioiodine has been used, no serious complications have been reported. Since the treatment appears to be extraordinarily safe, simple, and reliably effective, it is considered by most thyroid specialists in the United States to be the treatment of choice for those types of hyperthyroidism caused by overproduction of thyroid hormones.

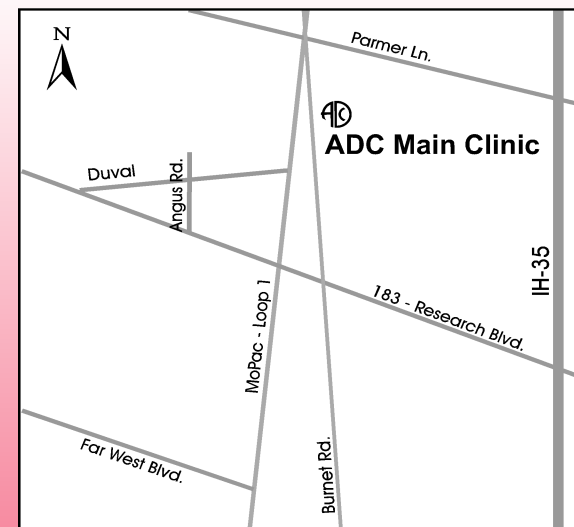
## Surgical removal of the thyroid

Although seldom used now as the preferred treatment for hyperthyroidism, operating to remove most of the thyroid gland may occasionally be recommended in certain situations, such as a pregnant woman with severe disease in whom radioiodine would not be safe for the baby, removal of the clinically suspicious thyroid nodule coexisting with hyperthyroidism, or for rare patients with Graves disease who have severe protrusion of their eyes. In such patients, permanent hypothyroidism usually results, and lifelong thyroxine replacement is required.

## Other treatments

A drug from the class of beta-adrenergic blocking agents (which decreases the effects of excess thyroid hormone) may be used temporarily to control hyperthyroid symptoms while one of the above mentioned treatments becomes effective. In cases where hyperthyroidism is caused by thyroiditis or excessive ingestion of either iodine or thyroid

hormone, this may be the only type of treatment required. Of course, taking too much of either substance should also be corrected. Appropriate management of hyperthyroidism requires careful evaluation and ongoing care by a physician experienced in the treatment of this complex condition.



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## What is an Endocrinologist?

Endocrinologists specialize in gland disorders which include thyroid, diabetes, osteoporosis, menopause, impotence, and other hormone and metabolic problems.

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CLINICAL ENDOCRINOLOGISTS

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