

Thyroid Diseases

Thyroid gland:

The thyroid is the butterfly-shaped, vascular endocrine gland located in the front of the neck that produces the hormone thyroxine. The thyroid regulates growth, development, metabolism, and normal bodily functions. It influences all cells in the body.

The thyroid gland produces the hormone thyroxine (T4), which is converted to the most active form, triiodothyronine (T3). With inadequate iodine in the diet, the thyroid cannot produce enough T4, and hypothyroidism develops.

The amount of thyroid hormone synthesized and released by the thyroid gland is controlled by the pituitary gland via thyroid-stimulating hormone (TSH). Abnormal thyroid function is reflected by TSH levels that are too low or too high.

What Are Thyroid Diseases?

When the thyroid gland is unable to produce adequate thyroxine, hypothyroidism develops. When the gland produces too much thyroxine, hyperthyroidism occurs. In addition, the thyroid gland may have nodules or become enlarged: become a goiter or a cancer.

Thyroid disorders, especially hypothyroidism, are common. The incidence of thyroid disorders increases after middle age and are more common in females and in older people.

The information provided in this website regarding any disease is not for purposes of diagnosis but to provide general information so that patients can be informed and communicate productively with their physicians. Always consult your healthcare providers about your own situation.



Thyroid Diseases Are Important:

Thyroid hormones influence all cells in our body. They regulate the body's ability to metabolize food and generate energy, control tissue growth and healthiness, and affect the function of all organ systems in the body.

Thyroxine affects feelings of tiredness and hunger, the condition of skin and hair, metabolism, heart rate, and emotional state. The amount of thyroid hormones released by the thyroid gland is controlled by the pituitary gland via the controlled release of TSH.

Abnormal thyroid function causes symptoms such as tiredness, irritability, slow or fast heart rate, weight loss or gain, anxiety or depression, and inability to sleep.

Common thyroid diseases:

Disease status occurs when thyroid hormones are over-produced (hyperthyroidism) or under-produced (hypothyroidism). Symptomatology can differ depending of age—younger versus older patients. Thus, treatment needs to be appropriately tailored for patient age, the presence of other health conditions (cardiac rhythm irregularities), and medications taken.

Certain medications interfere with the absorption of thyroxine. Thus, it is always advisable to take thyroxine on its own at least 1 hour apart from other drugs.

Common diseases of the thyroid gland:

- Hypothyroidism – Not enough thyroid hormone is produced (the most common disorder)
- Hashimoto's disease – An autoimmune disease causing thyroidal abnormalities; too little thyroid hormone is produced; a common cause of hypothyroidism
- Hyperthyroidism – Too much thyroxine is produced
- Graves' disease – An autoimmune disease that causes the thyroid gland to produce excess thyroid hormone—hyperthyroidism
- Goiter – Enlargement of the thyroid gland—irregular or regular enlargement
- Thyroid nodules – Irregular growth of thyroid tissue causing nodules (lumps) of various shapes and sizes within the thyroid gland
- Thyroiditis – Infections or inflammation of the thyroid gland
- Thyroid cancer – Growth of the thyroid gland that becomes cancerous

Thyroid hormones and pregnancy: In pregnancy, the demand for energy and nutrients increases to support growth of the fetus. Thyroxine is essential to produce energy and for proper fetal growth and development. The requirement of thyroxine increases by 30% to 40% toward the end of the first trimester of pregnancy and remains so until delivery.

In women with hypothyroidism, the thyroid cannot adjust automatically to this required increase. Therefore, thyroxine supplements need to be carefully and appropriately increased, titrated with measurement of the TSH level. The correct amount of thyroid hormone is critical for fetal development, especially the brain, and overall physical growth.

Postpartum thyroiditis: An inflammatory disorder of the thyroid gland occurring in about 5% to 8% of pregnancies. This disorder is more common in women with other autoimmune disorders, such as rheumatoid arthritis, type 1 diabetes, or lupus, or those with thyroid dysfunction before pregnancy.

Postpartum thyroiditis initially leads to hyperthyroidism, but many patients eventually experience hypothyroidism. In general, postpartum thyroiditis occurs within the first 4 months after delivery. The hyperthyroid phase of this disease (which may require beta-blocker therapy) usually lasts up to 3 months, and is followed by the hypothyroid phase. Symptoms include tiredness, weight gain, depression, and dry skin.

Mild postpartum thyroiditis requires no treatment, but severe disease need to be treated, depending on the phase of the disease. Although recovery is common, approximately 25% of women with postpartum thyroiditis will experience permanent hypothyroidism and require lifelong thyroxine replacement.

Hypothyroidism:

People with hypothyroidism may have no symptoms or may have a number of symptoms. Occasionally hypothyroid symptoms may resemble other diseases, such as depression, or mimic aging.

Symptoms of hypothyroidism and their severity vary from patient to patient. Patients with milder disease may or may not experience signs and symptoms. Examination of the neck may reveal enlarged thyroid gland or signs and symptoms of the disease, including:

- Decreased concentration
- Depression and apathy
- Coarseness or loss of hair
- Brittle nails and puffy face
- Hoarseness and muscular pain
- Cold intolerance
- Increased blood cholesterol
- Mental impairment or depression
- Frequent fatigue and a goiter
- Slow heartbeat and delayed reflexes
- Dry skin or infertility
- Irregular or heavy menses
- Constipation
- Weight gain from fluid retention

Diagnosis of hypothyroidism:

Those with a family history of thyroid disease are more likely to experience hypothyroidism. Testing for thyroid-stimulating hormone (TSH) [which controls the amount of thyroid hormone (T4) produced] is the recommended method for evaluating thyroid function. The TSH test generally is combined with the measurement of free thyroxine (T4) hormone.

Hypothyroidism can be due to a number of causes.

Hashimoto's disease: The most common cause of hypothyroidism. An autoimmune process causes inflammation that permanently destroys thyroid tissues, leading to hypothyroidism.

Surgical removal of the thyroid gland: In some cases, a part or all of the thyroid gland is removed because of disease, such as in patient with thyroid cancer. If the entire gland is removed, hypothyroidism will result, and lifelong thyroxine supplementation will be required. With partial removal of the thyroid gland (e.g., one of the two lobes), adequate levels of thyroid hormone may be produced, and supplements generally are not necessary.

Pregnancy-induced thyroiditis: Thyroiditis (usually autoimmune) may occur during or after pregnancy. This is caused by the immune system attacking the body's own thyroid cells. This condition may lead to postpartum hypothyroidism.

Radiation therapy: Radiation therapy to the head or neck may destroy all or part of the thyroid gland and lead to the development of hypothyroidism.

Some medications: Amiodarone, lithium, interferon alpha, and others drugs can interfere with the synthesis of thyroxine.

Pituitary gland abnormality: Damage to or abnormality of the pituitary gland or hypothalamus (e.g., after traumatic brain injury, cancer, and so forth) may impair the body's ability to generate releasing hormones from the hypothalamus and pituitary hormones such as including TSH. In the absence of TSH, the thyroid gland is unable to produce thyroxine.

Other causes: Inadequate iodine in the diet, poor fetal development of thyroid, or congenital hypothyroidism are other causes of hypothyroidism.

Diagnosis of hypothyroidism:

Having a family history of thyroid disease increase the chances of experiencing thyroid diseases. Certain signs or symptoms will prompt the physician to carry perform blood tests

to assess a patient's thyroidal status. The TSH test indicates overall thyroid gland function. The TSH test can be combined with measurement of free T4 (thyroxine) in the blood.

In mild hypothyroidism, the TSH level is increased; the thyroid gland is working hard to bring T4 levels to normal. Signs and symptoms may or may not be present.

In overt hypothyroidism, the thyroid is unable to make adequate amounts of hormone T4, so T4 levels will be low and the TSH level will be high. Patients will have signs and symptoms.

If a thyroid scan is ordered, it will reveal whether the whole thyroid or a part is enlarged or not functioning properly. In the absence of thyroid nodules, this test is not necessary. A thyroid antibody test will determine if the immune system is attacking the thyroid gland (Hashimoto's thyroid disease).

Treatment of hypothyroidism:

Thyroxine is prescribed for hypothyroidism. It replaces the thyroid hormone (T4) normally produced by the thyroid. Through blood tests done at 8-week intervals, the physician can make adjustments to optimize the dose.

Once the right dose is achieved, it is important for the patient to take the same generic or branded medication consistently to avoid fluctuations.

Over-replacement may lead to an increased risk of osteoporosis or heart problems, such as cardiac arrhythmia, whereas under-replacement will result in continued hypothyroidic symptoms, such as apathy, fatigue, constipation, weight gain, and depression.

Once the right dose is established, TSH and free T4 levels are tested on an infrequent basis (e.g., once every 6 months), and the dose adjusted if necessary, throughout the patient's life span.

Hyperthyroidism:

Those who have a family history of thyroid disease are more likely to experience hypothyroidism or hyperthyroidism. Your physician will request several simple laboratory tests to assess whether the thyroid gland is functioning properly. The most common test ordered is the TSH test, together with the free T4 hormone test.

In mild hyperthyroidism, patients may or may not have signs and symptoms. TSH levels fall below the normal range, but the T4 level may remain normal.

In overt hyperthyroidism, the TSH level will be suppressed with too-high levels of free T4. Signs and symptoms are present at this stage of the disease. Occasionally, a physician may need to measure the free T3 levels to make a diagnosis.

Common signs and symptom of hyperthyroidism:

Symptoms of hyperthyroidism are attributable to overactive metabolism. Patients may have symptoms such as increased heartbeat, agitation, and decrease in weight, diarrhea, goiter, eye problems (swelling), or thyroid tenderness. Some older people may not have symptoms but are more susceptible to cardiac arrhythmia.

Symptoms of hyperthyroidism:

The symptoms of hyperthyroidism and its severity may vary from patient to patient.

Signs and symptoms of hyperthyroidism are:

- Nervousness
- Mental disturbances
- Sleep disturbances
- Vision disturbances
- Thyroid enlargement
- Rapid heartbeat
- Weight loss
- Shortness of breath
- Heat intolerance
- Tremor
- Sudden paralysis
- Alterations in appetite
- Frequent bowel movements
- Menstrual disturbance
- Impaired fertility
- Leg swelling
- Fatigue and muscle weakness

Conditions that lead to hyperthyroidism:

Graves' disease: The most common cause of hyperthyroidism is Graves' disease—an autoimmune disease affecting the thyroid gland. Instead of the body responding appropriately by recognizing foreign invaders, such as bacteria or viruses, the immune system starts to attack the body's own thyroid tissue, stimulating excessive production of thyroid hormones.

In some patients, Graves' disease may be inherited. Many people with Graves' disease also experience eye problems due to autoantibodies. The eye muscles and soft tissues behind the eyes swell and push the eyes forward, resulting in eyes becoming prominent, red, and inflamed. The inability to close the eyelids may lead to damage to the corneas.

Thyroid nodules: Thyroid nodules, most of which are benign, are very common. They may be one or more than one nodules (multi-nodular goiter). Enlarged thyroid gland (goiter) may increase in size and often will appear (or disappear after some time). Sometimes, these thyroid nodules may increase in size or secrete excess amounts of thyroxine.

Thyroiditis: Thyroiditis is an inflammation of the thyroidal tissue that leads to leaching excess hormone to the bloodstream. In most cases, this settles down on its own but may need medical attention. Occasionally, hyperthyroidism secondary to thyroiditis becomes a recurring issue.

Over-treatment with thyroid hormone replacement: Taking too much thyroid hormone replacement may lead to symptoms of hyperthyroidism.

Postpartum hyperthyroidism: Women can experience hyperthyroidism after delivery. This hyperthyroidism may resolve or may evolve into hypothyroidism and require the patient to have lifelong thyroxine supplement therapy.

Drug-related hyperthyroidism: Certain medications, such as the cardiac agent amiodarone, may cause the thyroid to dysfunction, causing hypothyroidism or hyperthyroidism.

Additional test for hyperthyroidism:

A physician may request a radio-isotopic thyroid scan. With this test, an image of the thyroid gland is obtained to assess whether the whole gland or only some nodules are hyperactive.

Treatment of hyperthyroidism:

The treatment for hyperthyroidism depends on the disease severity and the patient's existing complications, age, and overall state of health. Therapy for hyperthyroidism in older people must be closely monitored for its potential adverse effects, both for over-treatment and under-treatment.

The following are various treatment options for patients with hyperthyroidism/Grave's disease:

Anti-thyroid drugs: Anti-thyroid agents block the thyroid gland from producing too much thyroid hormone. These drugs need to be used for some time (usually between 12 and 18 months) to control the hyperactive status of the gland. Anti-thyroid drugs are also used to prepare a patient before treatment with radioactive iodine or surgery.

Radioactive iodine: This treatment includes taking an oral pill containing radioactive iodine. The iodine will accumulate in the thyroid, destroying the overactive thyroid cells. It may take weeks to few months for this treatment to successfully control the thyroid gland. The outcome includes reduced size of the gland and less hormone produced. Some patients who undergo this treatment experience hypothyroidism and require thyroxine supplements.

Surgery: A surgeon may remove a part of the thyroid gland. This option is not as popular today as radioiodine therapy; a noninvasive therapy has become the mainstay of treatment.

Beta-blockers: The short-term use of generic, broad-spectrum beta-blockers, such as propranolol, is indicated when a patient has overt adrenergic symptoms of hyperthyroidism, such as rapid heart rate and nervousness.

It is important that patients follow physician directions and have thyroid hormone levels checked regularly; adjustments for the anti-thyroid medication are necessary throughout the treatment period. Once hormone levels are under control, the anti-thyroid drug dosage will gradually be reduced and eventually discontinued.

Your responsibility in managing thyroid disorders:

- If you have any symptoms of hypothyroidism or hyperthyroidism, discuss them with your physician and have a TSH test (or TSH and free T4 test). If available, request a referral to an endocrinologist.
- When receiving anti-thyroid drug therapy, promptly report to your physician any unusual symptom or sign, bleeding gums or in the skin, frequent infections, or the sudden onset of tiredness or pallor.
- Those with an autoimmune disease, such as type 1 diabetes or rheumatoid arthritis, older age or very young age, and those who have had surgery or radiation therapy may need to be tested more frequently until the optimum TSH and free T4 levels are achieved.

- Follow your physician's directions and take your medications exactly as prescribed.
- An annual TSH test can confirm if your thyroid is functioning normally.
- Patients with thyroid disease may require medications for a short time or lifelong thyroxine replacement therapy.
- As with any healthcare issue, you should speak with your physician about your situation and rely on his or her advice.

Goiter

Goiter is an enlarged thyroid gland; it may or may not have multiple nodules.

What causes a goiter?

A goiter can be caused by an underactive or overactive thyroid and can be associated with hypothyroidism or hyperthyroidism. Common causes of goiter include:

Iodine deficiency: Worldwide this is the most common cause of goiter. Iodine deficiency is uncommon in the North America because of the iodization of table salt. Inadequate iodine levels lead to low production of thyroxine, which stimulates the overproduction of TSH from the pituitary gland. High TSH levels stimulate the thyroid gland to grow in size and form a goiter.

Hashimoto's disease: Goiters may occur in people with Hashimoto's disease, an autoimmune disorder that causes inflammation of thyroid tissue. The consequent increase in TSH leads to enlargement of the thyroid gland.

Graves' disease: Goiters may occur in patients with Graves' disease, an autoimmune disorder that causes antibodies to work against the thyroid gland, causing it to produce too much thyroid hormone.

Thyroid nodules: One or more nodules may develop on the thyroid gland when tissues grow excessively around the thyroid. The vast majority of these nodules are benign. Other uncommon causes of goiters include inflammation, infection, pregnancy, and cancer.

Common testing for thyroidal nodules includes:

Thyroid function tests: TSH and free T4 levels assist in distinguishing whether one's thyroid (function) is underactive, overactive, or normal. Depending on the results from these first tests, additional tests may be indicated. Such tests include:

Radioactive thyroid iodine uptake scan: Assesses the amount of iodine absorbed by the thyroid (counting the radioactivity of the gland); helps to identify the cause and extent of thyroidal gland dysfunction.

Thyroid scan: An imaging technique to determine the part of the thyroid gland involved in causing disease.

Needle aspiration biopsy: Biopsy (fine needle aspiration) allows laboratory examination of cells from nodules to observe characteristics of the overgrowing cells and diagnose or exclude the possibility of a cancer.

Treatment of a goiter:

The treatment for a goiter depends on its cause. Thyroxine replacement therapy is indicated in those with hypothyroidism. In the case of hyperthyroidism, the treatment may be anti-thyroid drugs or radioablation of the thyroid. If a goiter is present but the thyroid hormone levels are normal, periodic monitoring or the TSH levels is indicated.

Thyroid nodules:

Most thyroidal nodules are benign; less than 5% may become malignant. Physical examination will reveal one or more nodules or cysts and enlargement of the thyroid. TSH levels and T4 levels demonstrate thyroid function.

A radioactive thyroid scan reveals whether the nodules are “cold” (not taking up radioactive iodine) or “hot” (taking up a lot of radioactive iodine). A fine needle aspiration biopsy may be required to determine the cytology and the best course of treatment.

Fine needle biopsy: A fine needle biopsy is done in the physician’s office or at a radiological facility, with the patient under local anesthesia. The procedure should be painless and takes no more than 10 minutes. Needle biopsy results will show whether the nodule is benign or cancerous and whether any additional tests are necessary for the diagnosis. Some aspirates can also be used for molecular diagnosis in certain forms of cancer.

Ultrasound examination: An ultrasound scan shows whether the nodule is solid or filled with fluid, its size (especially for comparison with a previous scan), and the need for needle aspiration.

Treatments for thyroid nodules:

The vast majority of nodules and cysts do not require any treatment, only periodic monitoring using ultrasound. However, suspicious or cancerous nodules should be removed surgically.

Thyroid hormone treatment may shrink the nodule size. If cancer is suspected or found, all or a part of the thyroid will be removed. Postoperative drug therapy with a daily dose of thyroxine is necessary, especially with suppressed TSH, thus preventing the potential regrowth.

Thyroid cancer

One in 20 thyroid nodules eventually turns out to be cancerous. Therefore, periodic checking of nodules is recommended.

What are the symptoms of thyroid nodules?

People who experience symptoms may complain of pain in the neck or ear, hoarseness, enlarged lymph nodes in the neck, difficulty swallowing, and shortness of breath if the nodule is large enough to press on the trachea.

Thyroid cancer is diagnosed by a FNA. This is the easiest way to determine if a nodule is cancerous. Some suspicious nodules may be determined to be cancerous only during or after surgery. In general, the prognosis for people with thyroid cancer is very good.

Common treatments include surgical removal of the whole thyroid gland and surrounding lymph nodes and treatment with thyroid hormones. Radioactive iodine therapy may be indicated in some patients, after surgery.

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