



THE DEEP STUDY OF THYROID GLAND AND DISEASES RELATED TO IT

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Abstract:

The commonest cause of thyroid disease worldwide is iodine deficiency, which causes goiter and hypothyroidism in some. However, autoimmune thyroid disease is the predominant form of thyroid dysfunction in the developed world. Although genetic (HLA-DR3, CTLA-4, and thyroglobulin gene mutations) and environmental factors (infection, smoking, and iodine status) have been implicated, its precise cause is unclear.^{1, 2}

Overt thyrotoxicosis or hypothyroidism occurs in about 2% of women and 0.2% of men in the UK.³ The incidence of hypothyroidism and hyperthyroidism in women is 4.1/1000 and 0.8/1000 per year respectively, but is much lower in men for both (0.6/1000 per year).⁴ More recent data suggest a higher incidence, for example, 4.98 (women) and 0.88/1000/year (men) for hypothyroidism and 0.77 (women) and 0.14/1000/year (men) for hyperthyroidism.⁵ The incidence of overt thyroid dysfunction may depend on population iodine intake.⁶ The main causes of hyperthyroidism

Key Words: Thyroid, Anti-Thyroid, Goiter, Autoimmune Disorders, Hypothyroidism, Hyperthyroidism, Diagnosis, Treatment, Symptoms.

Introduction:

Autoimmune thyroid disease is the predominant form of thyroid dysfunction in the developed world. Although its precise cause is currently unclear, principles of management have been established. There is a vigorous debate about the management of the increasingly commonly recognized subclinical forms of thyroid dysfunction despite recent recommendations. Nodular thyroid disease and thyroid carcinoma have received wide

attention. The effects of drugs and pregnancy on thyroid function have also been investigated widely. This short review attempts to give an overview and clarify the current management of common thyroid disorders.

What is thyroid?

1. A large ductless gland in the neck which secretes hormones regulating growth and development through the rate of metabolism. "Thyroid function"
2. A large cartilage of the larynx, a projection of which forms the Adam's apple in humans.

MOST COMMON TYPES

Thyroid nodules

A lump in the thyroid, the butterfly-shaped gland at the base of the neck.

Underactive thyroid (hypothyroidism)

A condition in which the thyroid gland doesn't produce enough thyroid hormone.

Hyperthyroidism

The overproduction of a hormone by the butterfly-shaped gland in the neck (thyroid).

Goiter

Abnormal enlargement of the butterfly-shaped gland below the Adam's apple (thyroid).

Thyroiditis

Inflammation of the thyroid, the butterfly-shaped gland in the neck.

Thyroid cancer

A cancer of the thyroid, the butterfly-shaped gland at the base of the neck.

Hyperthyroidism (overactive thyroid)

What is hyperthyroidism?

Your thyroid is an endocrine gland that secretes hormones into your bloodstream. It provides a vital function by regulating your metabolism.

Hyperthyroidism is a health condition that occurs when your thyroid gland becomes overactive and produces more thyroid hormones than you need.

When you have hyperthyroidism your metabolism speeds up, making your body work harder and faster. It is a common condition affecting more women than men.

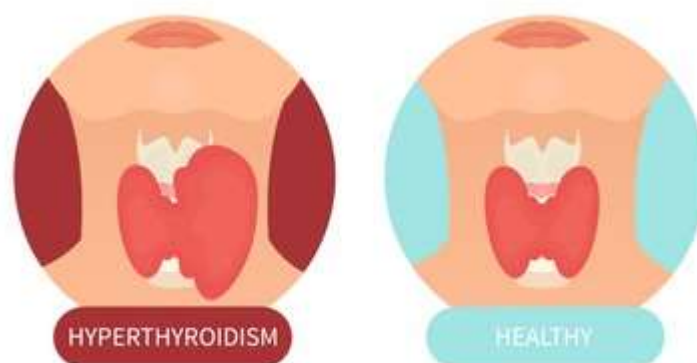


Fig. Hyperthyroidism and Healthy Gland

Causes of hyperthyroidism

There are several causes of hyperthyroidism, including: nodular thyroid disease
Thyroiditis – inflammation of the thyroid gland
Graves' disease.

Graves' disease:

The most common cause of hyperthyroidism is Graves' disease, an autoimmune disorder which is caused when your own immune system antibodies start to attack your body.

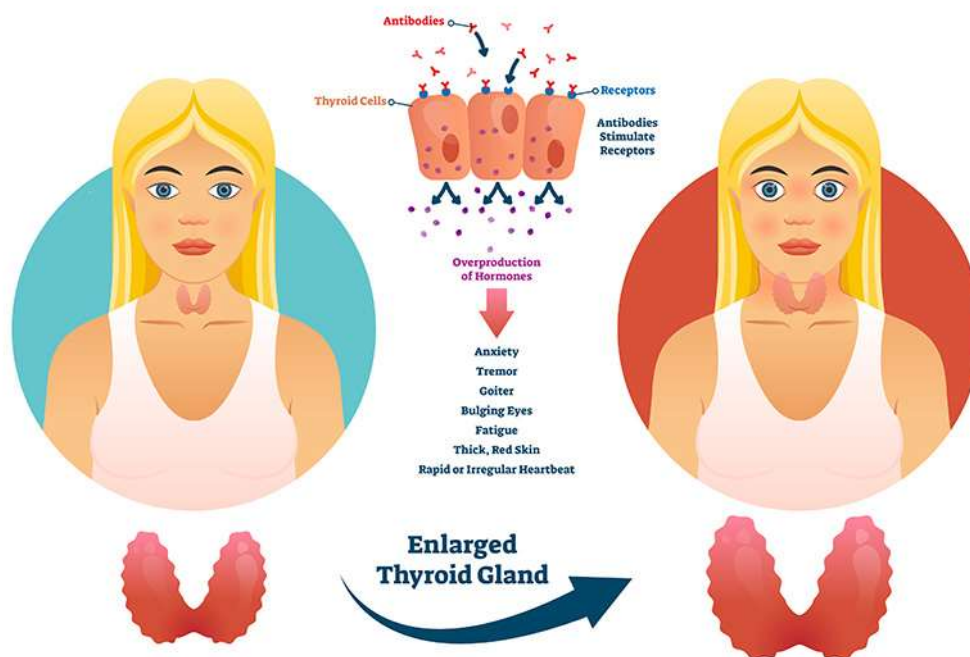


Fig. Graves' disease and Normal Thyroid gland

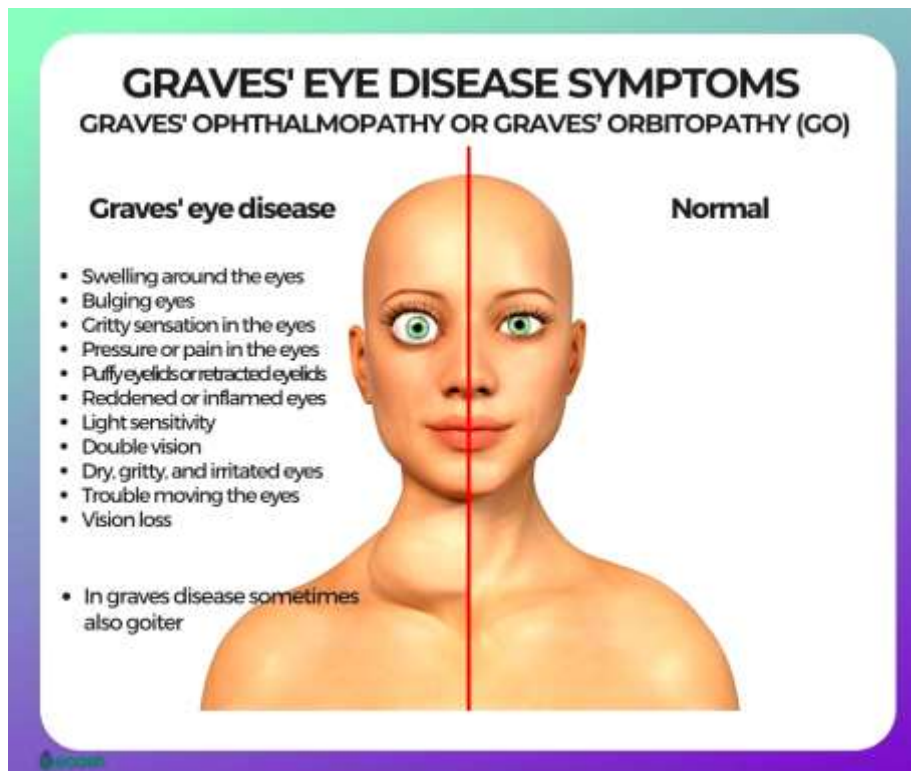
Your pituitary gland regulates the production of hormones by releasing a Thyroid Stimulating Hormone (TSH) chemical.

In Graves' disease, your own antibodies imitate the activity of the TSH and cause your thyroid to produce too much hormone.

Graves' disease is more commonly found in women between 20 and 40. You are more susceptible to the condition if you have family members affected by it.

In addition to hyperthyroidism symptoms, Graves's disease symptoms include:

1. Eye swelling
2. Protruding eyeballs
3. Goiter (an enlarged thyroid gland)
4. Thyroid eye disease
5. Double vision.



Signs and symptoms of hyperthyroidism

Hyperthyroidism presents a range of symptoms with most relating to the speed of your metabolism and include:

- Nervousness, anxiety, irritability and high emotions
- High libido
- Tremors and muscle weakness
- Heat intolerance and excessive perspiration
- Fatigue and interrupted sleeping patterns
- Unexplained weight loss or weight gain
- Increased heart rate and palpitations
- Rapid pulse
- Infrequent menstrual cycles and bleeding patterns
- Difficulties getting pregnant
- Diarrhea

- Shortness of breath, especially when exercising
- Loss of hair or hair thinning
- Enlarged thyroid gland (goiter)
- Double vision and swollen eyes.

Diagnosis of hyperthyroidism

Hyperthyroidism can be diagnosed by your doctor by testing your blood to determine your hormone levels.

In some cases your blood will also be tested for certain antibodies.

If your blood tests confirm you have hyperthyroidism, your doctor will refer you to an endocrinologist (hormone conditions specialist).

Your endocrinologist may perform further tests including scans.

Radioisotope scan

This test involves injecting a small volume of radioactive substance – iodine or sodium pertechnetate – into your blood. The test is safe and the level of radioactive substance is low.

Your neck is then scanned to detect overactive areas of your thyroid.

Ultrasound scan

An ultrasound is taken to measure the size and determine the exact location of a goiter.

Treatment of hyperthyroidism

There is no cure for hyperthyroidism although the condition is manageable. Treatment seeks to reduce the thyroid hormones to a normal level (a status called euthyroid) to regulate your metabolism.

Medication:

Depending on your specific condition, your doctor or endocrinologist may prescribe:

Anti-thyroid medications to reduce production of thyroid hormones

Beta-blockers to help control hyperthyroidism symptoms.

There is also the risk that your medication could lead to hypothyroidism (underactive thyroid), so you will need to have regular blood tests to ensure you are taking the correct dose.

Non-surgical procedures

Radioiodine treatment

Radioiodine is an iodine that has been made radioactive and is used to treat some thyroid conditions including thyroid cancer and most types of hyperthyroidism.

It involves taking a radioiodine capsule or drink, which is absorbed by your thyroid and as the radioactivity increases it destroys some of your thyroid tissue.

It's important that the dosage is accurate as the treatment could cause hypothyroidism if it is too high and you may require thyroxine replacement. Radioiodine is not suitable if you're pregnant or breastfeeding.

Surgery

Surgical options include a thyroidectomy, an operation that involves the surgical removal of all or part of the thyroid gland.

A thyroidectomy is usually recommended by your doctor if: other treatments have failed you may have thyroid cancer, if you are pregnant and unable to take anti-thyroid medicines.

As with all surgery there are some risks associated with this procedure that you should discuss with your doctor.

Treatment for thyroid eye diseases:

If you have Graves' disease you may also need treatment for eye disease, which is an associated health condition.

Temporary solutions include:

- wearing sunglasses
- using eye drops
- Keeping your head elevated while sleeping to avoid swelling.

For severe symptoms long term treatments include:

- Steroid medication
- Surgery
- Radiation therapy.
- Hypothyroidism - underactive thyroid

Thyroid conditions can easily be misdiagnosed as symptoms are similar to a range of other health conditions.

If you have an overactive thyroid it's important that you have your thyroid stimulating hormone (TSH), T4 and T3 hormone levels checked regularly.

When people are treated for hyperthyroidism they sometimes develop hypothyroidism – an underactive thyroid. This is because the medication causes the thyroid to go from overactive to underactive if the correct dose is not taken.

The difference between an underactive and an overactive thyroid is:

An underactive thyroid can be easily treated with hormone replacement (thyroxine) with no side effects. An overactive thyroid is a potentially fatal health condition if left undiagnosed and untreated.

Drug of choice for hyperthyroidism

Propylthiouracil (PTU)

One of the advantages of PTU is that it has a lower risk of birth defects and therefore it is the first line treatment for pregnant women.



A disadvantage is that PTU is only available in 50-milligram units. You need to take it in three equal doses, approximately 8 hours apart, each day. According to the American Thyroid Association clinical guidelines, daily dosage varies from 100 to 600 milligrams, depending on the seriousness of your condition and your age. This information is general, as dosing varies from patient to patient. Always follow your doctor's specific dosing instructions.

Methimazole (Tapazole)



The main benefit of Tapazole is that it can be taken one, two, or three times a day (depending on your dosage). Pills are available in 5 or 10 milligrams. It also has fewer side effects and often reverses hyperthyroidism quickly.

What is hypothyroidism?

Hypothyroidism, also called underactive thyroid, is when the thyroid gland doesn't make enough thyroid hormones to meet your body's needs. The thyroid is a small, butterfly-shaped gland in the front of your neck. Thyroid hormones control the way your body uses energy, so they affect nearly every organ in your body, even the way your heart beats. Without enough thyroid hormones, many of your body's functions slow down.

Illustration of the thyroid and its location in the neck.

The thyroid is a small gland in your neck that makes thyroid hormones.

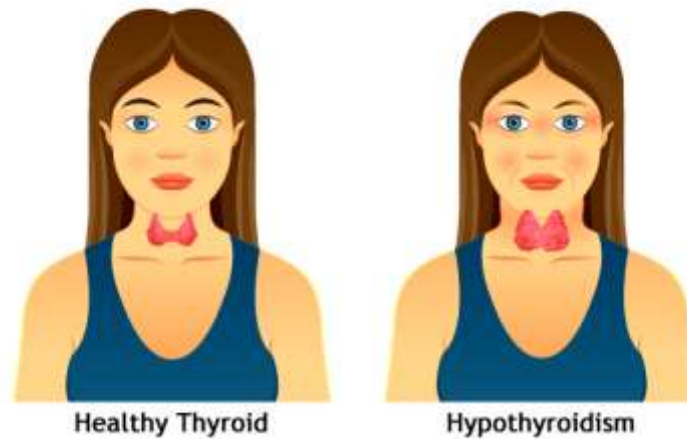


Fig. Hypothyroidism

How common is hypothyroidism?

Nearly 5 out of 100 Americans ages 12 years and older have hypothyroidism, although most cases are mild or have few obvious symptoms.¹

Who is more 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 60.¹

You are more likely to have hypothyroidism if you had a thyroid problem before, such as a goiter had surgery or radioactive iodine to correct a thyroid problem received radiation treatment to the thyroid, neck, or chest have a family history of thyroid disease were pregnant in the past 6 months have Turner syndrome NIH external link, a genetic disorder that affects women Your thyroid is also more likely to be underactive if you have other health problems, including

Celiac disease

Sjögren's syndrome NIH external link, a disease that causes dry eyes and mouth Pernicious anemia NIH external link, a condition caused by a vitamin B12 deficiency Type 1 or type 2 diabetes Rheumatoid arthritis NIH external link, an autoimmune disease that affects the joints Lupus NIH external link, a chronic autoimmune inflammatory condition Is hypothyroidism during pregnancy a problem?

Left untreated, hypothyroidism during pregnancy can affect both mother and baby. However, thyroid medicines can help prevent problems and are safe to take during pregnancy. Many women taking thyroid hormone medicine need a higher dose during pregnancy, so contact your doctor right away if you find out you're pregnant.

What are the complications of hypothyroidism?

Hypothyroidism can contribute to high cholesterol. If you have high cholesterol, you should get tested for hypothyroidism. Rarely, severe untreated hypothyroidism may lead to myxedema coma, an extreme form of hypothyroidism in which the body's functions slow to a life-threatening point. Myxedema coma requires immediate medical treatment.

What are the symptoms of hypothyroidism?

Hypothyroidism has many symptoms that can vary from person to person. Some common symptoms of hypothyroidism include Fatigue, weight gain, trouble tolerating cold joint and muscle pain, dry skin or dry, thinning hair heavy or irregular menstrual periods or fertility problems slowed heart rate depression

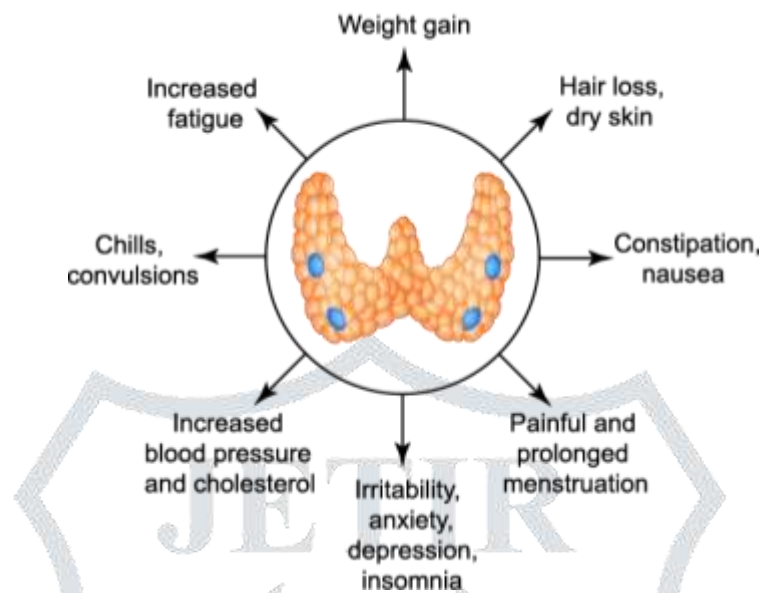


Fig. Symptoms of Hypothyroidism

Older woman with gray hair showing her thinning hair to female doctor. Dry, thinning hair is one of many symptoms that might indicate hypothyroidism. Because hypothyroidism develops slowly, you may not notice symptoms of the disease for months or even years. Many of these symptoms, especially fatigue and weight gain, are common and do not necessarily mean you have a thyroid problem.

What causes hypothyroidism?

Hypothyroidism has several causes, including
 Hashimoto's disease
 Thyroiditis, or inflammation of the thyroid
 Congenital hypothyroidism, or hypothyroidism that is present at birth
 Surgical removal of part or all of the thyroid
 Radiation treatment of the thyroid

Some medicines

Less often, hypothyroidism is caused by too much or too little iodine in the diet NIH external link or by disorders of the pituitary gland or hypothalamus NIH external link. Iodine deficiency, however, is extremely rare in the United States.

Hashimoto's disease

Hashimoto's disease, an autoimmune disorder, is the most common cause of hypothyroidism. With this disease, your immune system attacks the thyroid. The thyroid becomes inflamed and can't make enough thyroid hormones.

Hashimoto's disease causes your thyroid to become damaged. Most people with Hashimoto's disease develop hypothyroidism. Rarely, early in the course of the disease, thyroid damage may lead to the release of too much thyroid hormone into your blood, causing symptoms of hyperthyroidism.

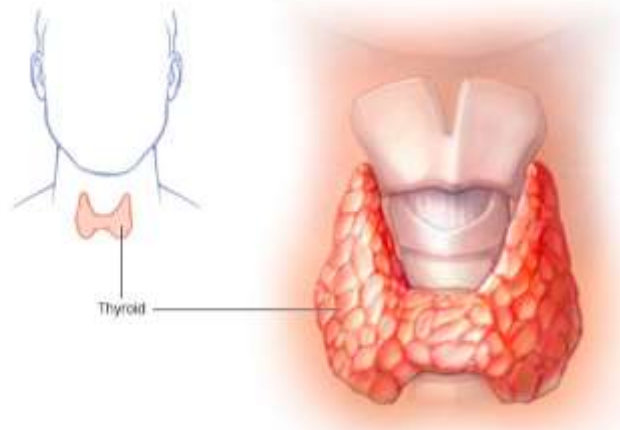


Fig. Hashimoto's disease

Your thyroid may get larger and cause the front of the neck to look swollen. The enlarged thyroid, called a goiter, may create a feeling of fullness in your throat, though it is usually not painful. After many years, or even decades, damage to the thyroid may cause the gland to shrink and the goiter to disappear.

Thyroiditis

Thyroiditis, an inflammation of your thyroid, causes stored thyroid hormone to leak out of your thyroid gland. At first, the leakage increases your blood's hormone levels, leading to thyrotoxicosis, a condition in which thyroid hormone levels are too high. The thyrotoxicosis may last for many months. After that, your thyroid may become underactive and, over time, the condition may become permanent, requiring thyroid hormone replacement.

Subacute thyroiditis involves a painfully inflamed and enlarged thyroid.

Postpartum thyroiditis develops after a woman gives birth.

Silent thyroiditis is painless, even though your thyroid may be enlarged. Experts think it is probably an autoimmune condition.

Congenital hypothyroidism

Some babies are born with a thyroid that is not fully developed or does not work properly. If untreated, congenital hypothyroidism can lead to intellectual disability, growth failure—when a baby doesn't grow as expected. Early treatment can prevent these problems. That's why most newborns in the United States are tested for hypothyroidism.

Surgical removal of part or all of the thyroid

When surgeons remove part of the thyroid, the remaining part may produce normal amounts of thyroid hormone. But some people who have this surgery may develop hypothyroidism. Removing the entire thyroid always results in hypothyroidism.

Surgeons may remove part or all of the thyroid as a treatment for hyperthyroidism a large goiter thyroid nodules, which are noncancerous tumors or lumps in the thyroid that can produce too much thyroid hormone small thyroid cancers NIH external link.

Radiation treatment of the thyroid

Radioactive iodine, a common treatment for hyperthyroidism, gradually destroys thyroid cells. If you receive radioactive iodine treatment, you probably will eventually develop hypothyroidism. Doctors also treat people who have head or neck cancers with external radiation therapy NIH external link, which can also damage the thyroid if it is included in the treatment.

Medicines

Some medicines can interfere with thyroid hormone production and lead to hypothyroidism, including certain heart medicines, bipolar disorder NIH external link medicines, cancer medicines.

How do doctors diagnose hypothyroidism?

Your doctor will take your medical history and perform a physical exam. A hypothyroidism diagnosis can't be based on symptoms alone because many of its symptoms are the same as those of other diseases.¹ That's why your doctor may use several thyroid blood tests and imaging tests to confirm the diagnosis and find its cause.

Because hypothyroidism can cause fertility problems, women who have trouble getting pregnant often get tested for thyroid problems. A female health care professional drawing blood from an older woman. A blood test might confirm a diagnosis of hypothyroidism.

How do doctors treat hypothyroidism?

Hypothyroidism is treated by replacing the hormones that your own thyroid can no longer make. You will take levothyroxine NIH external link, a thyroid hormone medicine identical to a hormone a healthy thyroid makes.³ usually prescribed in pill form, this medicine is also available as a liquid and as a soft gel capsule. These newer formulas may help people with digestive problems to absorb the thyroid hormone. Your doctor may recommend taking the medicine in the morning before eating.

Your doctor will give you a blood test about 6 to 8 weeks after you begin taking the medicine, adjusting your dose if needed. Each time your dose is adjusted, you'll have another blood test. Once you've reached a dose that's working for you, your doctor will probably repeat the blood test in 6 months and then once a year.

Your hypothyroidism most likely can be completely controlled with thyroid hormone medicine, as long as you take the recommended dose as instructed. Never stop taking your medicine without talking with your doctor first. Taking too much thyroid hormone medicine can cause serious problems, such as atrial fibrillation NIH external link or osteoporosis NIH external link.¹

How does eating, diet, and nutrition affect hypothyroidism?

Your thyroid uses iodine to make thyroid hormones. However, if you have Hashimoto's disease or other types of autoimmune thyroid disorders, you may be sensitive to iodine's harmful side effects. Eating foods that have large amounts of iodine—such as kelp, dulse, or other kinds of seaweed—may cause or worsen hypothyroidism. Taking iodine supplements can have the same effect.

Drug of choice for hypothyroidism:

Standard treatment for hypothyroidism involves daily use of the synthetic thyroid hormone levothyroxine (Levo-T, Synthroid, others). This oral medication restores adequate hormone levels, reversing the signs and symptoms of hypothyroidism.

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