Thyroid Disorders

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To: Dr. Doaa Ismail

For suggestions this study, her helping encouragement, valuable guidance and generous supervision to conduction of this work.

Thanks

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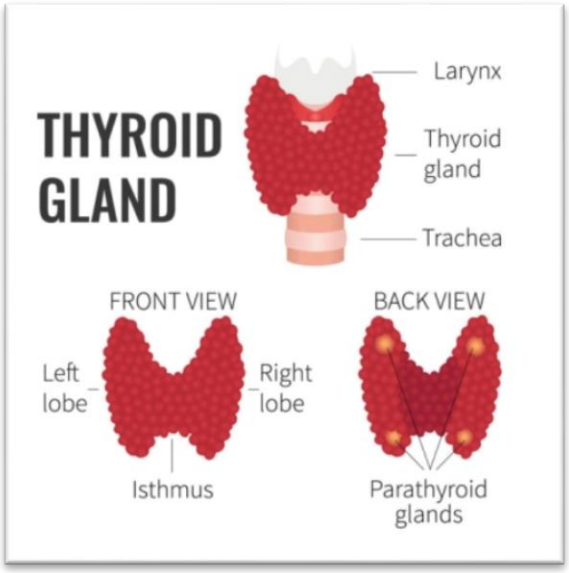


Thyroid disorders are conditions that affect the thyroid gland, a butterfly-shaped gland in the front of the neck. The thyroid has an important role in regulating numerous metabolic processes throughout the body. Different types of thyroid disorders affect either its structure or function.

The thyroid gland is located below Adam's apple wrapped around the trachea. A thin area of tissue in the gland's middle, known as the isthmus, joins the two thyroid lobes on each side.

The thyroid uses iodine to produce vital hormones. Thyroxine, also known as T4, is the primary hormone produced by the gland. After delivery via the bloodstream to the body's tissues, a small portion of the T4 released from the gland is converted to triiodothyronine (T3), which is the most active hormone (National Institute of Diabetes and Digestive and Kidney Diseases.

The function of the thyroid gland is regulated by a feedback mechanism involving the brain. When thyroid hormone levels are low, the hypothalamus in the brain produces a hormone known as thyrotropin-releasing hormone (TRH) that causes the pituitary gland (located at the base of the brain) to release thyroid-stimulating hormone (TSH). TSH stimulates the thyroid gland to release more T4.

Since the thyroid gland is controlled by the pituitary gland and hypothalamus, disorders of these tissues can also affect thyroid function and cause thyroid problems.

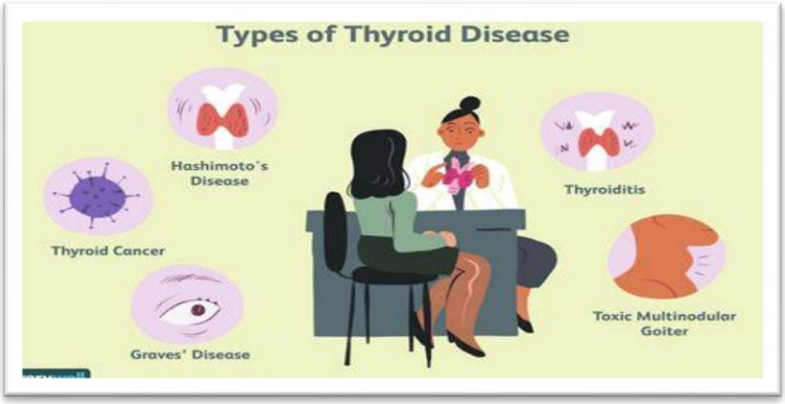
Risk Factors for Thyroid Problems:

Anyone can have thyroid problems, and thyroid disease is common. Women are five to eight times more likely than men to be diagnosed with thyroid issues. You also have a higher risk for them if you:

- Have a family history of thyroid problems.
- Have pernicious anemia, type 1 diabetes, primary adrenal insufficiency, lupus, rheumatoid arthritis, Sjögren's syndrome, or Turner syndrome.
- Take meds that have iodine.
- Are 60 or older.
- Had a previous thyroid condition or cancer (thyroidectomy or radiation).

There are specific kinds of thyroid disorders that include:

- Hypothyroidism
- Hyperthyroidism
- Goiter
- Thyroid nodules
- Thyroid cancer

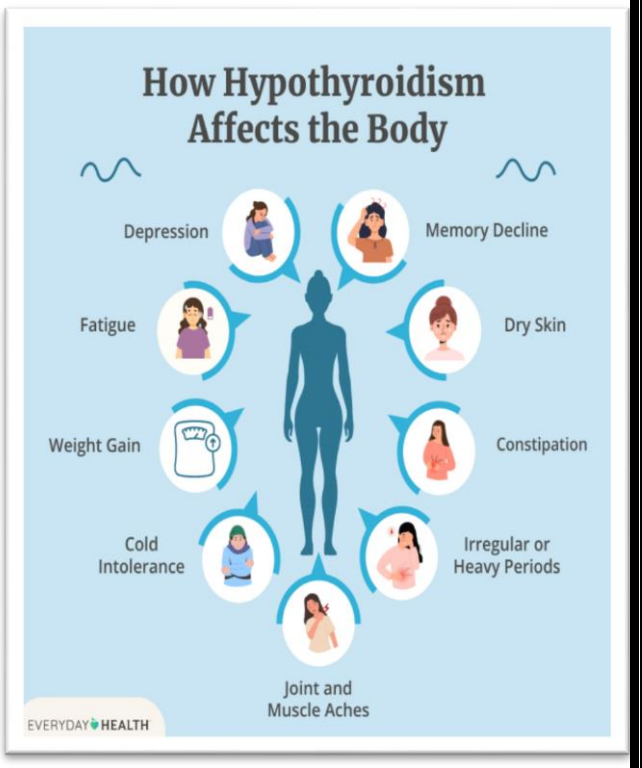


Hypothyroidism

Hypothyroidism results from the thyroid gland producing an insufficient amount of thyroid hormone. It can develop from problems within the thyroid gland, pituitary gland, or hypothalamus.

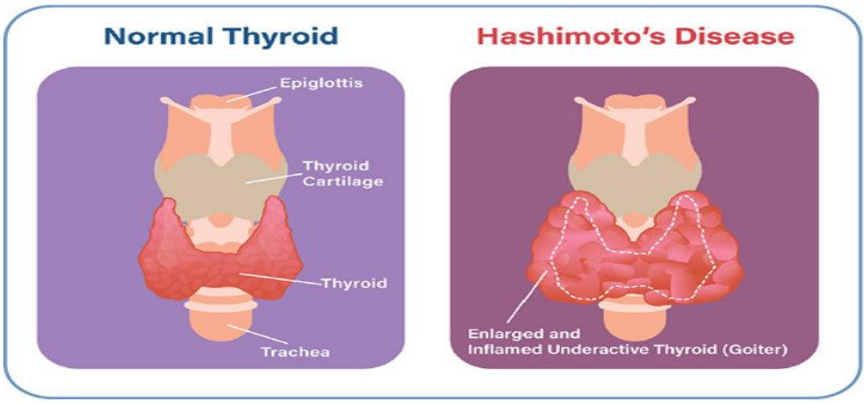
Symptoms of hypothyroidism can include:

- Fatigue
- Poor concentration or feeling mentally "foggy"
- Dry skin
- Constipation
- Feeling cold
- Fluid retention
- Muscle and joint aches
- Depression
- Prolonged or excessive menstrual bleeding in women.



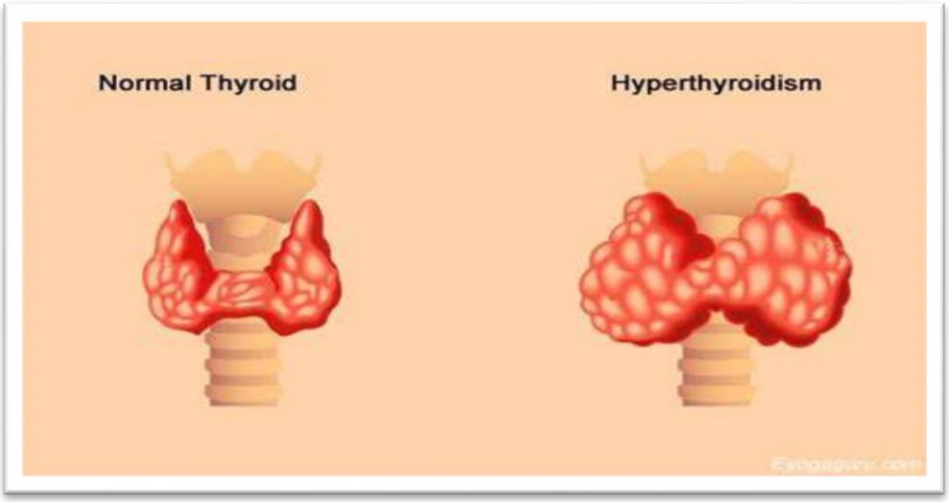
Causes of hypothyroidism include:

- Hashimoto's thyroiditis: In this autoimmune disorder, the body attacks thyroid tissue. The tissue eventually dies and stops producing hormones.



- Postpartum thyroiditis: This can happen anytime in the year after you give birth, or have a miscarriage or abortion. It's not common, occurring in 5% to 9% of those situations. It's usually a temporary condition.
- Iodine deficiency: Iodine is used by the thyroid to produce hormones. An iodine deficiency is an issue that affects several million people around the world.
- Removal of your thyroid gland: Your thyroid may have been surgically removed or chemically destroyed.
- Exposure to excessive amounts of iodine: Cold and sinus medicines, the heart medicine amiodarone, or certain contrast dyes given before some X-rays may expose you to too much iodine.
- Past thyroid issues: You may be at greater risk for hypothyroidism if you have had thyroid problems in the past.
- Lithium: This drug is also linked to hypothyroidism

Hyperthyroidism



Hyperthyroidism describes excessive production of thyroid hormone, a less common condition than hypothyroidism. Symptoms of hyperthyroidism usually relate to increased metabolism. In mild cases, there may not be apparent[1].

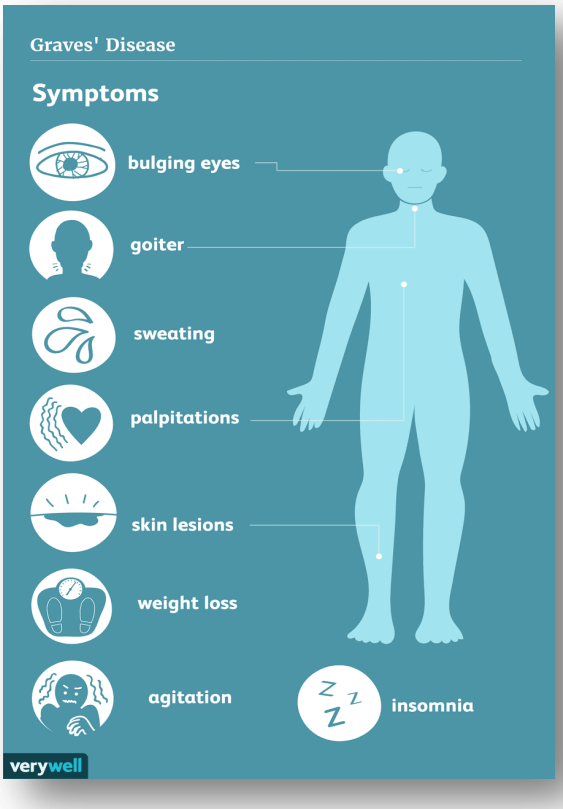
Symptoms and signs of hyperthyroidism can include:

- Tremor
- Nervousness
- Fast heart rate
- Fatigue
- Intolerance for heat
- Increase in bowel movements
- Increased sweating
- Concentration problems
- Unintentional weight loss

Some of the most common causes of hyperthyroidism include:

- Graves' disease
- Toxic multinodular goiter
- Thyroid nodules that overexpress thyroid hormone (known as "hot" nodules)
- Excessive iodine consumption

Graves’ disease



It is an autoimmune disease in which your immune system attacks healthy tissue in your thyroid gland for unknown reasons. It’s the most common cause of hyperthyroidism, a condition in which your thyroid gland makes too much thyroid hormone.

Your thyroid is a small, butterfly-shaped endocrine gland located at the front of your neck under your skin. Your thyroid’s main job is to regulate the speed of your metabolism (metabolic rate), which is the process of how your body transforms the food you consume into energy, by releasing certain hormones.

Graves’ disease affects women more than men. It typically occurs in people between the ages of 30 and 50, but it can affect children and older adults.

Your risk of developing Graves' disease increases if you have a family history of thyroid disease and/or you smoke cigarettes.

You're also more likely to get Graves' disease if you have another autoimmune disease, such as:

- Rheumatoid arthritis.
- Lupus.
- Type 1 diabetes.
- Celiac disease.
- Vitiligo.

Even though Graves' disease is the most common cause of hyperthyroidism, accounting for 60% to 80% of hyperthyroidism cases, it's a relatively rare condition. Approximately 1.2% of people in the United States have hyperthyroidism [2].

Thyroid hormone affects several parts of your body and bodily functions. Because of this, Graves' disease/hyperthyroidism (excess thyroid hormone) can affect many parts of your body, including your:

- Heart.
- Skeletal muscle (the muscles that help you move).
- Eyes.
- Skin.
- Bones.
- Liver.

For example, excess thyroid hormone can cause rapid heartbeat and lead to more serious heart conditions and cause osteoporosis (weakened bones).

Because Graves' disease affects several aspects of your health, it's important to seek medical treatment for it.

Symptoms of hyperthyroidism can include:

- Rapid heartbeat (palpitations).
- Feeling shaky and/or nervous.
- Weight loss.
- Increased appetite.
- Diarrhea and/or more frequent bowel movements.
- Thin, warm and moist skin.
- Intolerance to heat and excessive sweating.
- Difficulty sleeping, such as insomnia.
- Enlarged thyroid gland (goiter).
- Hair loss and change in hair texture (brittle).
- Menstrual changes.
- Muscle weakness.

If you're experiencing these symptoms, see your healthcare provider.

Graves' disease can also cause eye disease symptoms, including:

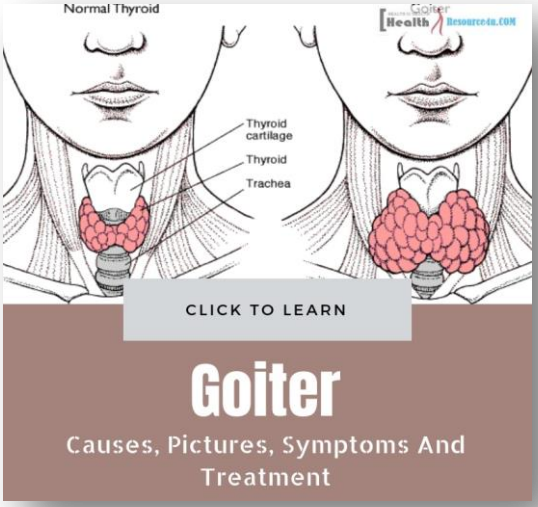
- Gritty, irritated eyes.
- Swelling of the tissues around your eyes (puffy eyes).
- Bulging eyes.
- Light sensitivity.
- Pressure or pain in your eyes.
- Blurred or double vision.

This is called Graves' ophthalmopathy or orbitopathy or thyroid eye disease. Only about a third of people with Graves' disease develop this condition. If you're experiencing these symptoms, it's important to see your eye doctor (optometrist or ophthalmologist).

Rarely, people with Graves' disease develop a lumpy, reddish thickening of the skin on their shins known as pretibial myxedema (called Graves' dermopathy). It's usually painless and mild, but it can be painful for some people.

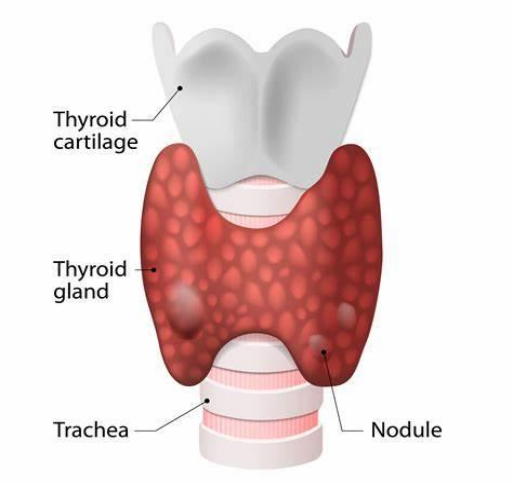
Goiter

A goiter simply describes enlargement of the thyroid gland, regardless of cause. A goiter is not a specific disease per se. A goiter may be associated with hypothyroidism, hyperthyroidism, or normal thyroid function[3].

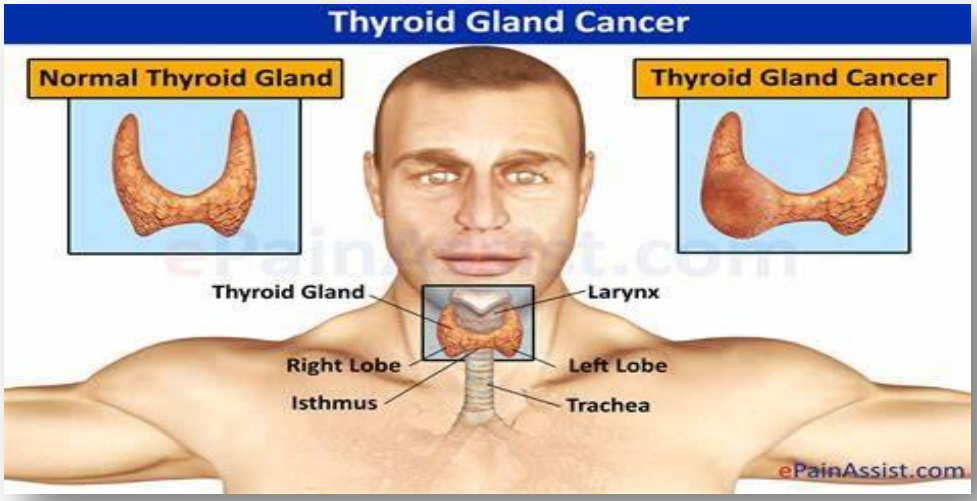


Thyroid nodules

- Nodules are lumps or abnormal masses within the thyroid. Nodules can be caused by benign cysts, benign tumors, or, less commonly, by cancers of the thyroid. Nodules may be single or multiple and can vary in size. If nodules are excessively large, they may cause symptoms related to compression of nearby structures.



Thyroid cancer



Thyroid cancer is far more common among adult women than men or youth. About 2/3 of cases occur in people under age 55. There are different kinds of thyroid cancer, depending upon the specific cell type within the thyroid that has become cancerous. Most cas es of thyroid cancer have a good prognosis and high survival rates, especially when diagnosed in its early stages.

Risk factors for thyroid cancer include radiation exposure, low iodine diet, obesity, family history, and certain hereditary conditions. While thyroid cancer is a treatable cancer with a high survival rate, some patients develop hypothyroidism as a result from thyroidectomy or radiation treatment[3].

Thyroiditis

This is the swelling or inflammation of the thyroid gland, and can present either as hyperthyroidism or hypothyroidism. Hashimoto's is one type of thyroiditis. The other common type, which occurs in 5 to 10 percent of women after they've given birth, is called postpartum thyroiditis. It has two phases:

- The first phase starts 1 to 4 months after giving birth and results in hyperthyroidism. The damaged thyroid is leaking hormones into the blood.

- The second phase occurs 4 to 8 months post-pregnancy and presents as hypothyroidism, as by then, the thyroid has lost most of its hormones.

In most women, postpartum thyroiditis resolves by itself within 12 to 18 months post-delivery. Treatment can be given and it depends on whether the symptoms are those of hyper- or hypothyroidism[4].

Other types of thyroiditis include silent or painless thyroiditis and subacute thyroiditis. They both have similar presentation to postpartum thyroiditis, but are not connected with giving birth.

In addition to thorough medical history and physical exams, specialized tests are used to diagnose thyroid disorders.

- **Blood tests** are typically done to measure levels of thyroid hormones and TSH. Blood tests to identify antibodies against thyroid tissue may also be ordered by your doctors, such as titers of anti-thyroglobulin, anti-thyroperoxidase, or TSH receptor-stimulating antibodies.
- **Imaging tests** are commonly used when thyroid nodules or enlargements are present. Ultrasound can visualize the consistency of the tissue within the gland and can often reveal cysts or calcifications. Ultrasound examination cannot distinguish a benign from a malignant process.
- **Thyroid scans** using radioactive iodine are often performed to evaluate the function of thyroid nodules. The thyroid is the only location in the body that takes up iodine, so when radioactively labeled iodine is given, it is taken up by the thyroid gland. An imaging test typically shows the uptake of

radioactive iodine by normal thyroid tissue. Areas or nodules that are producing excess hormone (referred to as hyper functioning) will show increased uptake of iodine. These are referred to as "hot" nodules or areas. By contrast, so-called "cold" nodules represent areas with decreased iodine uptake. "Cold" nodules do not produce excess hormones and can sometimes represent cancer.

- **Fine needle aspiration and biopsy** are techniques that remove a sample of cells or tissue from the thyroid gland for examination and diagnosis by a pathologist, who is a physician trained in the diagnosis of conditions based on tissue samples. Fine needle aspiration (FNA) uses a long, thin needle to withdraw a sample of cells from the thyroid. FNA can be performed in the doctor's office. Sometimes, ultrasound imaging is used to guide the FNA procedure. A biopsy is the surgical sampling of tissue.

Thyroid diseases generally aren’t preventable. This is because most cases of thyroid disease are linked to genetics and/or caused by autoimmune conditions, which you can’t prevent [5].

Thyroid disorders can be treated by medications or, in some cases, surgery. Treatment will depend on the particular disease of the thyroid.

Thyroid medications

Medications can be given to replace the missing thyroid hormone in hypothyroidism. Synthetic thyroid hormone is given in pill form by mouth. When hyperthyroidism is present, medications can be used to decrease the production of thyroid hormone or prevent its release from the gland.

Other medications can be given to help manage the symptoms of hyperthyroidism, such as increased heart rate. If hyperthyroidism is not controlled with medications, radioactive ablation can be performed. Ablation involves giving doses of iodine labeled with radioactivity that selectively destroys the thyroid tissue.

Thyroid surgery

Surgery can be used to remove a large goiter or a hyper functioning nodule within the gland.

Surgery is necessary when there is a possibility of thyroid cancer. If the thyroid gland is removed entirely, the individual will need to take synthetic thyroid hormone for life.

Thyroid surgery can also be used in Graves' Disease (subtotal thyroidectomy) and was the treatment of choice before RAI therapy and anti-thyroid medications. It is not used much now.

Complications of hypothyroidism

Thyroid diseases affect many parts of your body and health. If you consistently follow your treatment plan to manage the condition, it's usually not serious[6].

But if thyroid disease is undiagnosed or not treated properly, it can cause complications, such as:

- **Goiter:** The lack of thyroid hormone causes constant stimulation of the thyroid gland causing enlargement of the thyroid gland. This is called goiter. Goiter can cause cosmetic concerns and can affect breathing and swallowing.
- **Cardiac (heart) problems:** Hypothyroidism increases the risk of heart disease and causes irregular heart rate and heart failure. Hypothyroidism increases the levels of low-density lipoprotein (LDL) cholesterol, known as the "bad" cholesterol, leading to cardiovascular complications.
- **Mental health issues:** Depression, slow mental function, lethargy, and poor memory can occur and may worsen over time.
- **Peripheral neuropathy:** Long-term untreated hypothyroidism can cause damage to your peripheral nerves (in the arms and legs). Patients present with pain, numbness, and tingling in affected areas.
- **Myxedema:** This is a rare, life-threatening complication of long-term, untreated hypothyroidism. Its signs and symptoms include swelling of the face including the lips, eyelids, and tongue, and swelling and thickening of the skin and underlying tissues anywhere in the body having a waxy texture. Patients also have intense cold intolerance and drowsiness followed by profound lethargy and unconsciousness.
- **Infertility:** Low levels of thyroid hormone can interfere with ovulation presenting with irregular periods.
- **Birth defects:** Babies born to women with untreated thyroid disease may have a higher risk of being born with birth defects. The children also have a risk of serious developmental problems.
- **Infants**: Infants with untreated hypothyroidism present at birth are at risk for serious problems with both physical and mental development.

- **Pregnant women**: Untreated hypothyroidism during pregnancy increases the risk of miscarriage, premature **delivery preeclampsia (high blood pressure in the last** trimester of pregnancy), and birth defects in the developing baby.

If untreated, hyperthyroidism can lead to various complications, such as:

- **Cardiac (heart) complications:** Cardiac complications of hyperthyroidism can be serious and life-threatening. Cardiac complications include a rapid heart rate and altered heart rhythm called atrial fibrillation which can increase the risk of stroke and heart failure.
- **Brittle bones:** Untreated hyperthyroidism can lead to osteoporosis (weak, brittle bones) causing the bones to fracture easily. Increased thyroid hormones impair the body's ability to incorporate calcium into the bones.
- **Eye complications:** Those with Graves' ophthalmopathy develop eye problems, including bulging, red, or swollen eyes, photophobia (sensitivity to light), blurry vision or double vision, and even loss of vision/blindness.
- **Skin complications:** Those with Graves' disease develop Graves' dermopathy, which is characterized by redness and swelling of the skin, usually on the shins and feet.
- **Thyrotoxic crisis:** Thyrotoxic crisis is a sudden intensification of symptoms, causing fever, palpitations, and altered mental status. This requires emergency medical attention.

Certain foods may interfere with the ability of the thyroid gland to process or produce thyroid hormones. These are called goitrogens.

Foods that are bad for your thyroid may include:

The high content of fluoride in cold drinks damages the thyroid gland like no other beverage.

Foods belonging to the brassica family such as broccoli, kale, cauliflower, and cabbage contain substances that may alter thyroid function. These foods, especially if eaten raw (salads), can cause T3 and T4 levels to dip.

Soy foods such as tofu, edamame, and soybeans contain isoflavones that act as goitrogens in your body and inhibit the production of thyroid hormones. Steer clear of soy products and select fermented soy foods to minimize the concentration of goitrogenic compounds in your diet[7].

Iodine which is essential for a healthy thyroid gland may paradoxically suppress T3 and T4 function if taken in excess. Daily consumption of iodine should not be more than 150 grams. Hence, only take iodide supplements such as kelp, nori, and seaweed under a doctor's supervision.

Fried foods and foods that contain saturated fats are also bad for thyroid health and function.

Although consuming gluten is generally not a problem for most people, it can impair nutrient absorption and trigger GI inflammation in those who have celiac disease. Unfortunately, some people with hypothyroidism, which is caused by an autoimmune disorder such as Hashimoto’s disease, are also at a high risk of being affected by celiac disease. Some people must avoid gluten completely to maintain thyroid function.

Caffeine dependence is detrimental to your thyroid and adrenal glands. Caffeine blocks the absorption of thyroid hormone, so you should minimize caffeine consumption as much as possible if you have hypothyroidism.

Excess sugar consumption wreaks havoc on the body. In addition to causing a slew of diseases, it interferes with T4 conversion which is necessary for thyroid function.

Alcohol can suppress the thyroid gland's ability to produce thyroid hormones, which is why doctors advise people who have an underactive thyroid to stop drinking alcohol.

Foods that support healthy thyroid function may include

- **Protein**: Grass-fed meats, free-range chicken, wild-caught seafood, and beans (slow-cooked)
- Selenium: Brazil nuts, organic liver, cold-water fish, and garlic
- **Magnesium**: Dark leafy greens, almonds, pecans, and flax seeds
- **Vitamin B12**: Grass-fed meats, free-range chicken and eggs, and wild-caught seafood
- Iodine: Wild-caught seafood, seaweed, and kelp
- **Iron**: Grass-fed beef, organic beef liver, spinach, and sardines
- **Zinc**: Grass-fed meats, free-range chicken, wild-caught seafood, and almonds
- **Vitamin B2**: Grass-fed meats, organic organ meats, almonds, and green vegetables
- **Vitamin D**: Sunshine, egg yolks, organic liver, and wild-caught fish
- Omega-3 fatty acids: Wild-caught fish, walnuts, chia, and flax seeds
- **Vitamin C**: Broccoli, ٢٠russels sprouts, citrus fruits, and berries
- **Vitamin A**: Free-range eggs, green vegetables, and organic liver

Is thyroid disease a serious illness?

Thyroid diseases affect many parts of your body and health. If you consistently follow your treatment plan to manage the condition, it's usually not serious[8].

Can I live a normal life with thyroid disease?

A thyroid disease is often a lifelong medical condition that you'll need to manage consistently. This often involves daily medication. Your healthcare provider will monitor your treatments and adjust them over time.

It may take some time to find the right treatment plan for you to manage your hormone levels. But you can usually live a normal life with thyroid disease.

If you have symptoms of hypothyroidism or hyperthyroidism or notice a change in your neck's appearance where your thyroid is, see a healthcare provider. It's important to get a diagnosis and start treatment.

If you learn that a biological family member has a thyroid disease, be sure to update your provider so they can add it to your medical record. Thyroid diseases often run in families. It's good to know your history in case you ever develop symptoms of thyroid disease.

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