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THYROID PROBLEMS AND DIET CONSIDERATIONS



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YOUR HEALTH**

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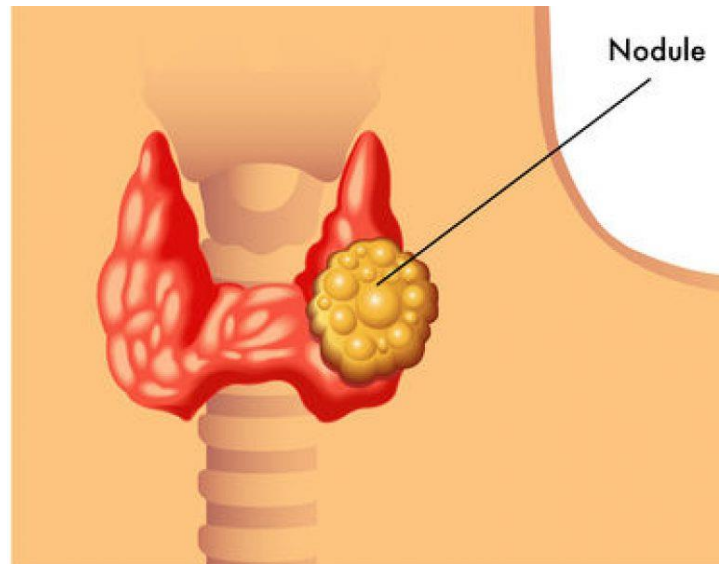
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THYROID NODULES OVERVIEW

The thyroid is a butterfly-shaped gland in the middle of the neck, located below the larynx (voice box) and above the clavicles (collarbones). Thyroid nodules are round or oval-shaped areas within the thyroid that can be caused by a number of conditions, most of which are not serious.



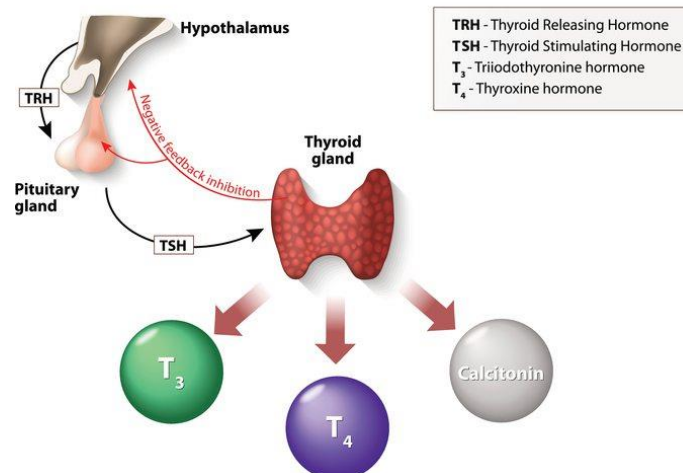
WHAT DOES THE THYROID DO?

The thyroid produces two hormones, triiodothyronine (T3) and thyroxine (T4), which regulate how the body uses and stores energy. Thyroid function is controlled by the pituitary gland, which is located just below the brain.

The pituitary produces a hormone that stimulates the thyroid to produce T3 and T4. This hormone is called thyroid-stimulating hormone (TSH).

Thyroid nodules are very common; up to half of all people have at least one thyroid nodule, although most do not know about it. Thyroid nodules can be caused by many different conditions. Reassuringly, approximately 95 percent of all thyroid nodules are caused by benign (noncancerous) conditions.

THYROID HORMONES



THYROID NODULES DIAGNOSIS

Diagnostic tests can determine if a thyroid nodule is benign or malignant (cancerous); this information can help to guide treatment decisions. There are several diagnostic tests, and each provides unique information about the thyroid nodule. However, not every person with a thyroid nodule needs all of these tests.

Often, a test will provide a definitive answer about the type and cause of a nodule. In other cases, a test may be inconclusive, and further testing will be required.



1. Thyroid-stimulating hormone — Thyroid-stimulating hormone (TSH) can be measured with a blood test.
 - If the blood test shows that TSH level is normal, the next step is to have a thyroid ultrasound. Depending upon the appearance of the nodule on ultrasound, a fine-needle aspiration (FNA) biopsy may be recommended.
 - Low levels of TSH in the blood may indicate that a nodule is producing high levels of thyroid hormone. If TSH level is lower than normal, the next step is to have a thyroid scan.
 - High levels of TSH may indicate autoimmune inflammation of the thyroid (called Hashimoto's thyroiditis). Another blood test, to measure levels of thyroid antibodies, is sometimes recommended in this case. An FNA biopsy may also be needed.
2. Thyroid ultrasound — A thyroid ultrasound should be done if there is a suspected thyroid nodule or nodular goiter after a physical examination. Ultrasound should also be done if nodules are found through imaging studies done for other reasons (for example, carotid ultrasound, computed tomography [CT], magnetic resonance imaging [MRI], or positron emission tomography [PET] scan).

Thyroid ultrasonography provides information about the size and anatomy of the thyroid gland and nearby structures in the neck as well as the characteristics of the nodule. This information can be used to identify which nodules require FNA biopsy.
3. Fine-needle aspiration — In most cases, the TSH level is normal, and if the ultrasound shows features that are suspicious for cancer, the next step is fine-needle aspiration (FNA). FNA uses a thin needle to remove small tissue samples from the thyroid nodule. The tissue is then examined with a microscope.

FNA biopsy can be done in a doctor's office with a local anesthetic (medicine to numb the area). It can be performed by palpation (meaning the doctor uses their fingers to feel the nodule) but is usually done using ultrasound guidance. The patient may feel mild discomfort as the anesthesia is injected, and may feel some pressure during the biopsy, but it should not be very painful.



The results of a biopsy will be one of the following:

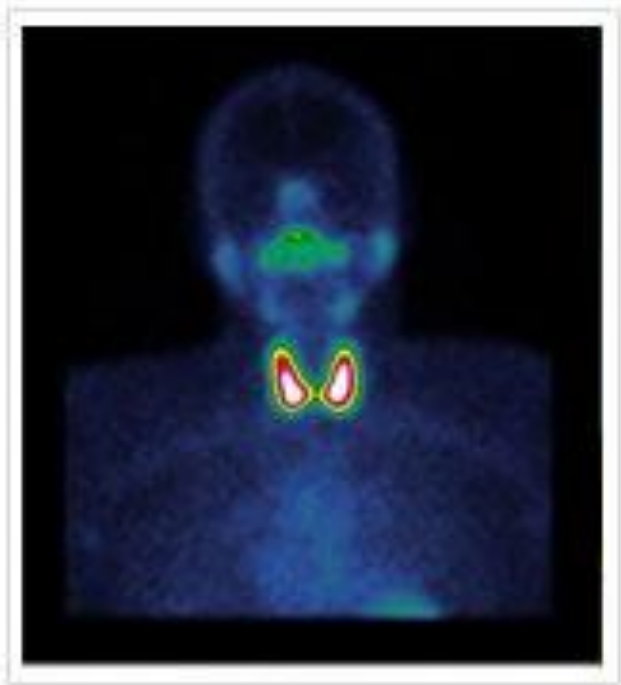
- a) Benign (noncancerous)
- b) Malignant (cancerous)
- c) Suspicious for malignancy
- d) Indeterminate – This means that the findings are neither clearly benign nor malignant, the risk of malignancy is low, and further testing may be advised. The following classifications are considered indeterminate, and require further evaluation:
 - Follicular neoplasm
 - Follicular lesion or atypia of undetermined significance (nodules with atypical cells or some microfollicles)

- Nondiagnostic or insufficient – In this case, the biopsy does not contain enough tissue to make a diagnosis, and a repeat biopsy is necessary.

"Indeterminate" results make up approximately 15 percent of cases. Surgical removal of a nodule may be recommended for indeterminate nodules for a definitive diagnosis. However, in most cases in countries where the technology is available, a biopsy sample is tested for specific "molecular markers" (genetic characteristics that affect how likely a nodule is to be malignant) instead of being removed with surgery. This information is used to determine whether the nodule should be observed or removed surgically for closer examination.

4. Thyroid scan — While most people do not have to have a thyroid scan, it may be recommended if a blood test shows that TSH level is low. In this case, the thyroid scan (rather than a biopsy) is the first step after the blood test.

A thyroid scan can help to determine if a thyroid nodule is "hot," meaning it produces too much thyroid hormone, or "cold," meaning it does not. The scan is typically performed after taking a small dose of radioiodine (in the form of pill); alternatively, a substance called technetium may be injected into a vein, but this is less reliable. Because the dose of radioiodine (or technetium) is small, the amount of radiation exposure from a thyroid scan is relatively low. The risk of exposure is considered small compared with the benefit of knowing if treatment is needed. However, thyroid scan should not be done during pregnancy or breastfeeding.



- Thyroid nodules that absorb the radioiodine are usually not cancerous (called autonomous, hot, or toxic).
- Thyroid nodules that do not absorb the radioiodine are called cold and have a 5 percent risk of being cancerous. Approximately 95 percent of thyroid nodules are cold.

THYROID NODULES TREATMENT

The appropriate thyroid nodule treatment depends upon the type of thyroid nodule that is found.

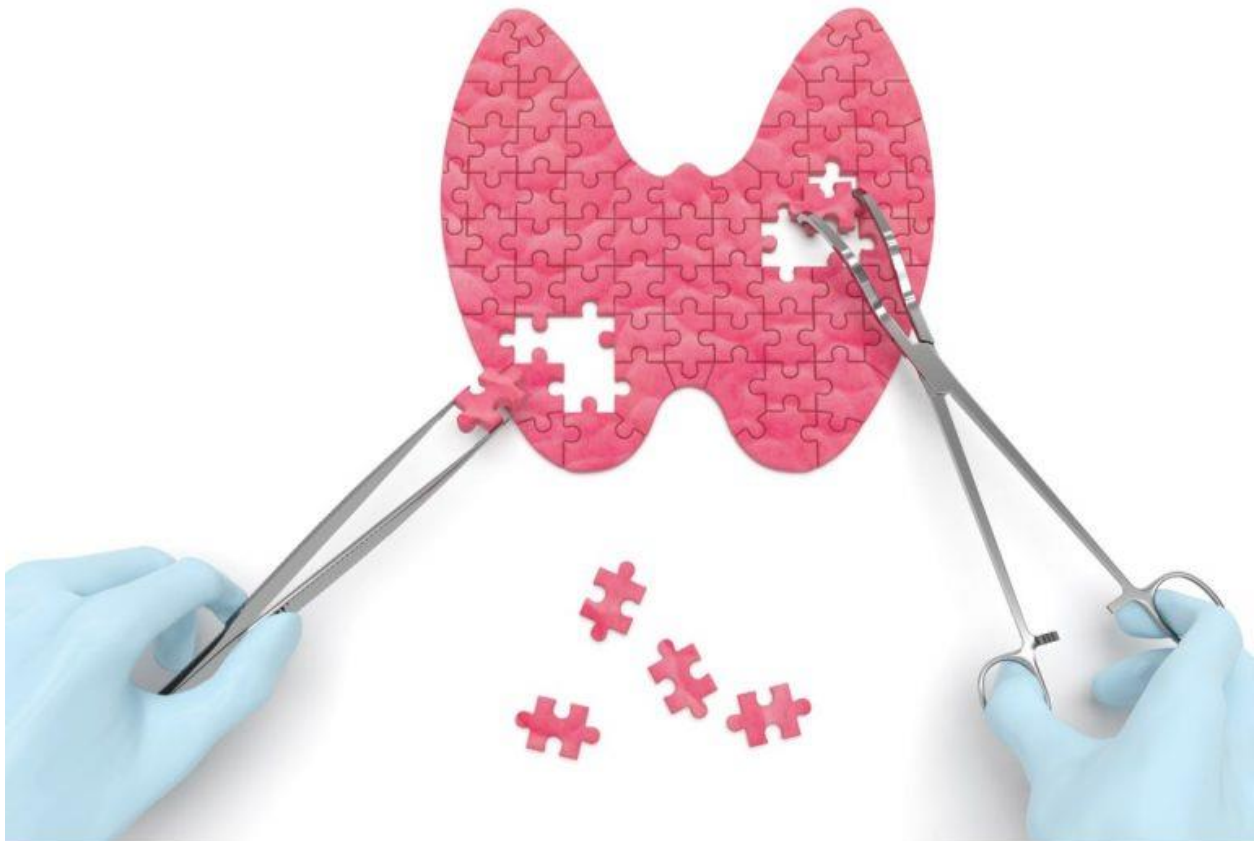
Benign thyroid nodules — usually develop as a result of overgrowth of normal thyroid tissue. Surgery is not usually recommended, and a benign nodule can be monitored with ultrasound over

time. If it grows, a repeat biopsy or surgery may be recommended. Some surgeons recommend excision of nodules over 4 cm.

Large benign thyroid nodules may also be treated with radiofrequency ablation. With this technique, a needle-like probe is inserted in the nodule using ultrasound guidance. The probe uses thermal energy (heat) to destroy most of the nodule and reduce its size.

Suppressive (thyroid hormone) treatment — If a thyroid nodule is not cancerous, but the nodule is large, some health care providers will suggest a trial of thyroid hormone (thyroxine [T4]) to shrink the nodule; this is called suppressive treatment. The American Thyroid Association guidelines do not recommend this treatment, because only a small percentage of nodules shrink and suppressive therapy may have side effects (eg, abnormal heart rhythm or loss of calcium from bone). Thyroid hormone levels should be monitored carefully during suppressive treatment.

Do all thyroid nodules need surgery?



Malignant thyroid nodules (thyroid cancer) — Only approximately 5 percent of all thyroid nodules are malignant. Most people with thyroid cancer have an excellent chance of cure or long-term survival.

The exact treatment approach will depend on the type and size of cancer. Thyroid cancers require surgical removal of all or part of the thyroid gland and sometimes one or more treatments with radioiodine, followed by thyroid hormone (T4). The goal of taking thyroid hormone is to keep thyroid-stimulating hormone (TSH) in the lower portion of the normal range or even slightly below normal. If entire thyroid is removed with surgery, patients will need to take daily thyroid hormone for life.

Suspicious for malignancy — Nodules in this category have a 50 to 75 percent risk of malignancy. People with nodules that are suspicious for malignancy frequently have a lobectomy (in which part of the thyroid is removed) or a total thyroidectomy (removal of the entire thyroid) because the chance that the nodule is a cancer is higher than the chance it is benign.

Follicular neoplasm — Nodules in this category have a 10 to 40 percent risk of malignancy. If the biopsy shows follicular neoplasm, health care provider may do a thyroid scan, especially if TSH level is in the lower portion of the normal range. If the scan shows a "cold" (non-hormone-producing) nodule or TSH is not low, provider may test a biopsy sample for certain molecular markers (if available). This information is used to determine whether the nodule should be observed or removed surgically for closer examination.

If surgery is necessary, a hemithyroidectomy (removal of half of the thyroid) or a total thyroidectomy (removal of the entire thyroid) may be recommended depending on the results of the molecular testing, the size of the nodule, and preferences. "Hot" thyroid nodules are usually not cancerous, and treatment options are based on the results of thyroid function tests and other factors.



Follicular lesion or atypia of undetermined significance — Nodules in this category have a 6 to 18 percent risk of malignancy. Molecular markers are frequently used to select low-risk nodules for observation rather than surgery. Many people whose biopsy shows nodules with atypical cells require repeat fine-needle aspiration (FNA). However, in some centers, a sample for molecular testing is obtained with all FNAs. The sample is submitted for analysis if the result is follicular lesion or atypia of undetermined significance.

The optimal treatment depends upon individual factors, such as personal risk for thyroid cancer and past test results (including biopsy, molecular testing, and ultrasound).



Nondiagnostic — A nondiagnostic (or insufficient) biopsy does not have enough cells for interpretation. It should not be considered a negative biopsy. If the biopsy came back as nondiagnostic, the FNA should be repeated using ultrasound guidance.

"Hot" thyroid nodules — Some thyroid nodules produce thyroid hormone, similar to the thyroid gland, but do not respond to the body's hormonal controls. These nodules are called "hot" or "autonomous" thyroid nodules. They are almost always benign, but they can produce too much thyroid hormone, a condition known as hyperthyroidism.

If the patients have an autonomous thyroid nodule and high levels of thyroid hormone, they will probably be advised to have surgery to remove the thyroid nodule, or to undergo radioiodine treatment to destroy the nodule. Long-term treatment with the antithyroid drug methimazole is also an option, although methimazole cannot be taken during pregnancy.

If they have an autonomous nodule and normal thyroid function or minimal hyperthyroidism, the appropriate treatment will depend on their age and other health factors:

- In young adults, autonomous nodules may be monitored over time.

- In older adults, radioiodine treatment or surgery may be recommended because high thyroid hormone levels pose a risk of an abnormal heart rhythm (atrial fibrillation) and bone loss (osteoporosis).

Cystic thyroid nodules — Cystic thyroid nodules are usually benign nodules that have filled with fluid. These nodules may simply collapse when the fluid is removed. Cystic nodules are usually monitored for changes. If the cyst comes back or if the nodule bleeds more than once, surgery can be performed to remove the thyroid nodule. Sometimes the fluid is removed and the cyst is treated by injecting ethanol, which causes the sides of the cyst to become stuck to each other. This prevents the cyst fluid from building up again.



HYPERTHYROIDISM OVERVIEW

(overactive thyroid)

Hyperthyroidism is the medical term for an overactive thyroid (the prefix "hyper" means excessive).

In people with hyperthyroidism, the thyroid gland produces too much thyroid hormone.

When this occurs, the body's metabolism is increased, which can cause a variety of problems.



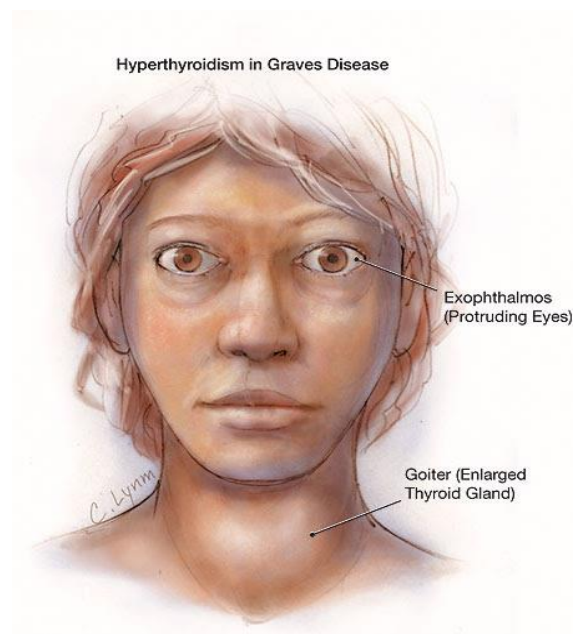
HYPERTHYROIDISM CAUSES

Graves' disease — Graves' disease is the most common cause of hyperthyroidism. It is not clear why Graves' disease develops in most people, although it is more common in certain families.

In people with Graves' disease, the immune system produces an antibody that behaves like TSH in that it stimulates the thyroid gland to produce too much thyroid hormone. This is most common in women between the ages of 20 and 40 years but can occur at any age in men or women.

The thyroid gland enlarges (called a goiter) and makes excessive amounts of thyroid hormone, causing symptoms of hyperthyroidism.

Some people develop eye problems (called Graves' ophthalmopathy, orbitopathy, or simply thyroid eye disease); this causes dry, irritated, or red eyes and, in severe cases, may cause double vision. Other people develop swelling behind or around the eyes that causes the eyes to bulge out or inflammation of muscle in the eyelids that can cause excessive lid swelling or opening. The more severe manifestations of Graves' eye disease are uncommon, except in people who smoke. In its most severe form, people with thyroid eye disease can develop inflammation of the optic nerves, which can result in loss of vision.



Other causes

- One or more thyroid nodules (small growths or lumps in the thyroid gland) can produce too much thyroid hormone. The nodule is then called a hot nodule, toxic nodule, or, when there is more than one, a toxic nodular goiter.
- Painless ("silent or lymphocytic") thyroiditis and postpartum thyroiditis are disorders in which the thyroid becomes temporarily inflamed and releases thyroid hormone stores into the bloodstream, causing hyperthyroidism.
- Postpartum thyroiditis can occur several months after delivery. The hyperthyroid symptoms may last for several months, often followed by several months of hypothyroid symptoms, such as fatigue, muscle cramps, bloating, and weight gain.

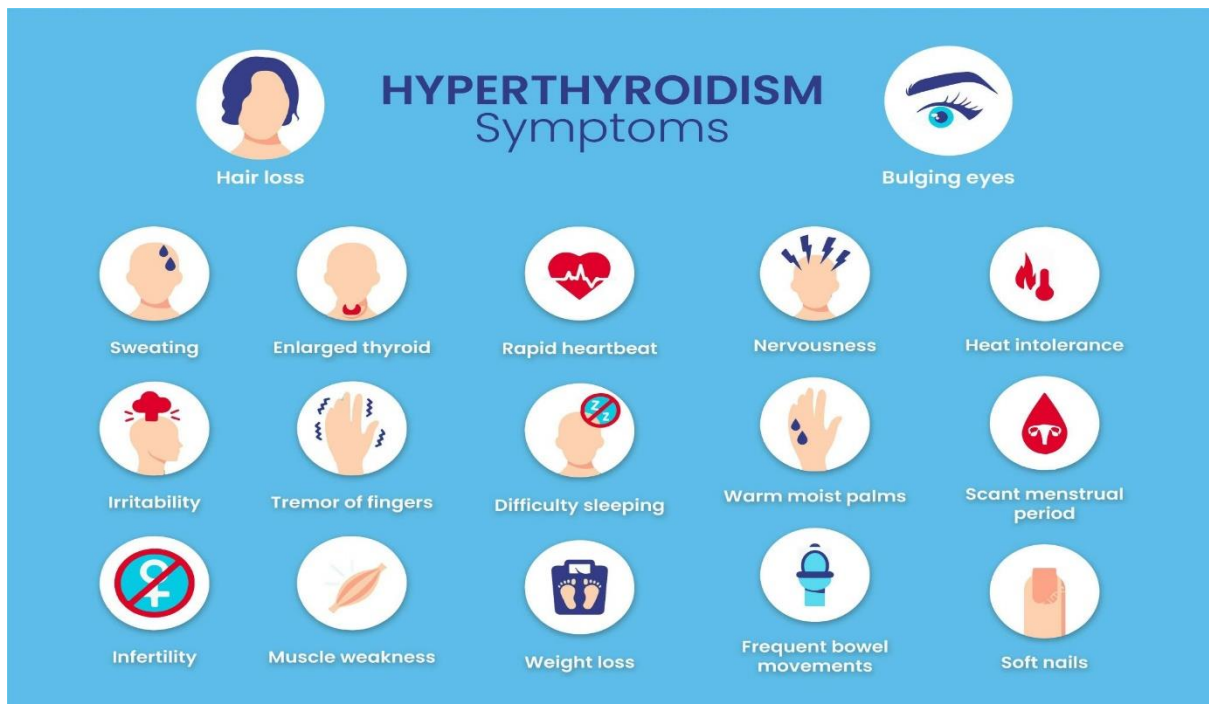


- Subacute (granulomatous) thyroiditis is thought to be caused by a virus. It causes a painful, tender, enlarged thyroid gland. The thyroid becomes inflamed and releases thyroid hormone into the blood stream; the hyperthyroidism resolves when the viral infection improves and may also be followed by several months of hypothyroid symptoms. Coronavirus disease 2019 (COVID-19) has been associated with subacute thyroiditis.
- Taking too much thyroid hormone medication for hypothyroidism increases blood levels into the range seen in people with hyperthyroidism.

HYPERTHYROIDISM SYMPTOMS

Most people with hyperthyroidism have symptoms, including one or more of the following:

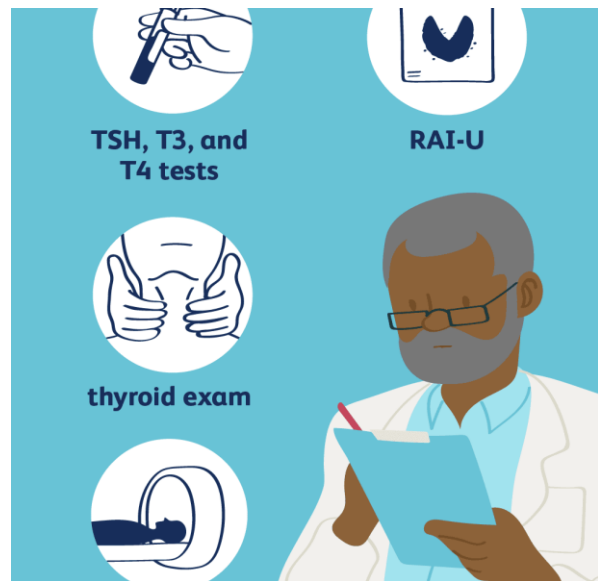
- Anxiety, irritability, trouble sleeping
- Weakness (in particular of the upper arms and thighs, making it difficult to lift heavy items or climb stairs or get up from a chair)
- Tremors (of the hands)
- Perspiring more than normal, difficulty tolerating hot weather
- Rapid, forceful, or irregular heartbeats
- Fatigue
- Weight loss in spite of a normal or increased appetite
- Frequent bowel movements



In addition, some women have irregular menstrual periods or stop having their periods altogether. This can be associated with infertility. Men may develop enlarged or tender breasts or erectile dysfunction, which resolves when hyperthyroidism is treated.

HYPERTHYROIDISM DIAGNOSIS

Hyperthyroidism can be diagnosed with blood tests that measure the amount of thyroid hormone and thyroid-stimulating hormone (TSH). Typically, the thyroid hormone level is high, and the TSH level is low. A thyroid scan or a blood test for the antibody that causes Graves' disease may also be recommended to help determine whether hyperthyroidism is caused by Graves' disease, toxic nodular goiter or thyroiditis.



HYPERTHYROIDISM TREATMENT

Hyperthyroidism can be treated using medicine, radioiodine, or surgery. Many factors, such as the age and the severity and type of hyperthyroidism, as well as the preferences, are important in determining which treatment is best.

Medications — The two main types of medicines used to treat hyperthyroidism are antithyroid drugs and beta blockers.

Antithyroid drugs — Antithyroid drugs, such as methimazole (brand name: Tapazole) and propylthiouracil, work by decreasing how much thyroid hormone the body makes. Both are very effective, but methimazole is preferred because of a greater risk of serious side effects with propylthiouracil. Carbimazole is similar to methimazole and is used in many countries.

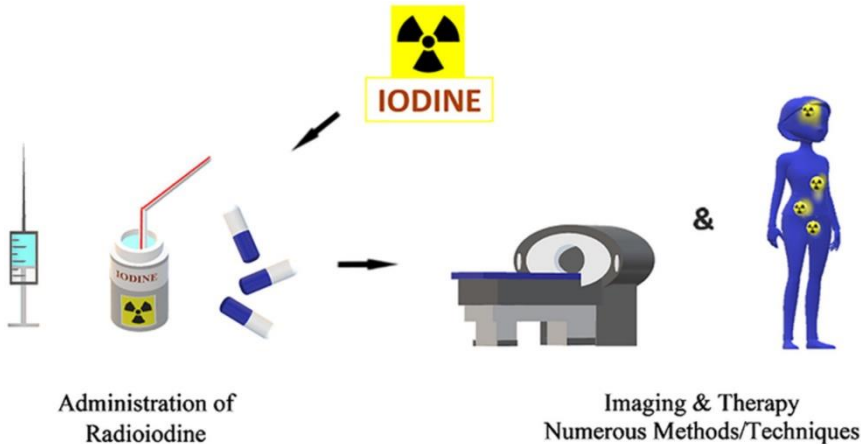
Because methimazole can be associated with serious birth defects if taken during pregnancy, propylthiouracil is the preferred drug during the first trimester; while propylthiouracil can also be associated with birth defects, they are less severe. For hyperthyroidism presenting after the first trimester, methimazole is preferred.

Beta blockers — Beta blockers, such as atenolol or propranolol, are often started as soon as the diagnosis of hyperthyroidism is made. While beta blockers do not reduce thyroid hormone production, they can control many of the bothersome symptoms, such as rapid heart rate, tremors, anxiety, and heat intolerance. Once the hyperthyroidism is under control (with antithyroid drugs, surgery, or radioiodine), the beta blocker is stopped.



Radioiodine — Destroying the thyroid with radioiodine, called ablation, is a permanent way to treat hyperthyroidism. The amount of radiation used is small and does not cause cancer, infertility, or birth defects.

Radioiodine is given in liquid or capsule form, and it works by destroying much of the thyroid tissue. This takes approximately 6 to 18 weeks. People with severe symptoms, older adults, and people with heart problems should first be treated with an antithyroid drug to control symptoms. Most people who take radioiodine develop hypothyroidism and will need to take thyroid hormone supplements for the rest of their lives.



As with most treatments, there are some risks with radioiodine:

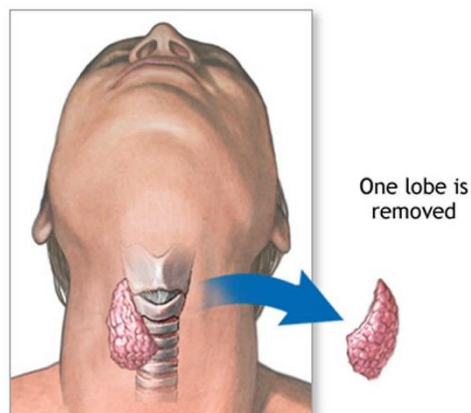
- Sometimes, after apparently successful treatment, the condition returns, and further treatment is needed.
- Approximately 14 percent of people who use radioiodine treatment require a second dose. These people usually have severe hyperthyroidism or a very large goiter.
- Twice as many patients who receive radioiodine experience worsening of their eye disease compared with patients who have surgery.

People who are treated with radioiodine should avoid close physical contact, especially with young children and pregnant people, for five to seven days after treatment because of the possibility of exposing them to low doses of radiation. This can be difficult for parents of young children.



Patients will need to see their health care provider on a regular basis after treatment to have their thyroid hormone levels checked and monitor for hypothyroidism or recurrent hyperthyroidism.

Surgery — Although surgical removal of the thyroid is a permanent cure for hyperthyroidism, it is used far less often than antithyroid drugs because of the risks (and expense) associated with thyroid surgery. The risks include damage to the nerves to the voice box and damage to the parathyroid glands, which regulate the body's calcium balance.



However, surgery is recommended when:

- A large goiter blocks the airways, making it difficult to breathe
- Patient cannot tolerate antithyroid drugs and do not want to use radioiodine
- There is a nodule in the thyroid gland that could be cancer
- Active Graves' eye disease
- In people desiring pregnancy who want definitive treatment before conceiving

The follow-up after surgery includes regular appointments to test the thyroid hormone levels and monitor for signs of hypo- and hyperthyroidism. Almost everyone develops hypothyroidism after surgery and requires treatment with thyroid hormone.

PREGNANCY AND HYPERTHYROIDISM



If a patient takes antithyroid drugs and is considering future pregnancy, she should discuss her treatment with her health care provider before trying to get pregnant. There are risks to the mother and developing baby if hyperthyroidism is not well controlled; these risks can be avoided or minimized with frequent monitoring and medication adjustment throughout the pregnancy.

People who are pregnant or breastfeeding should not be treated with radioiodine. Having radioiodine treatment or surgery before becoming pregnant usually eliminates the need for antithyroid drugs and any possible associated risks. A person should wait at least six months after radioiodine treatment before trying to become pregnant.

HYPOTHYROIDISM OVERVIEW

(underactive thyroid)

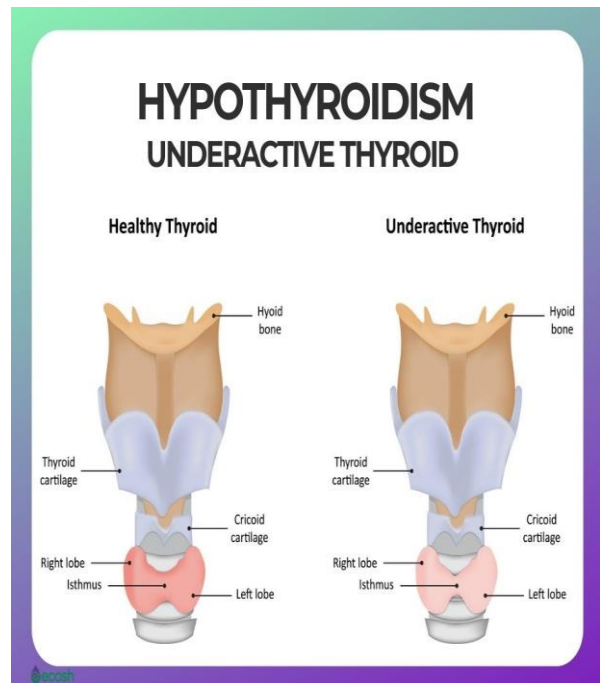
Hypothyroidism is a condition in which the thyroid gland does not produce enough thyroid hormone. It is the most common thyroid disorder.

HYPOTHYROIDISM CAUSES

In approximately 95 percent of cases, hypothyroidism is due to a problem in the thyroid gland itself and is called "primary hypothyroidism."

However, certain medications and diseases can also decrease thyroid function. As an example, hypothyroidism can also develop after medical treatments for hyperthyroidism, such as thyroidectomy (surgical removal of the thyroid) or radioiodine treatment (to destroy thyroid tissue). In some cases, hypothyroidism is a result of decreased production of thyroid-stimulating hormone (TSH) by the pituitary gland (called secondary hypothyroidism).

Thyroid problems are more common in females, increase with age, and (in the United States) are more common in white people and Mexican Americans than in African Americans.

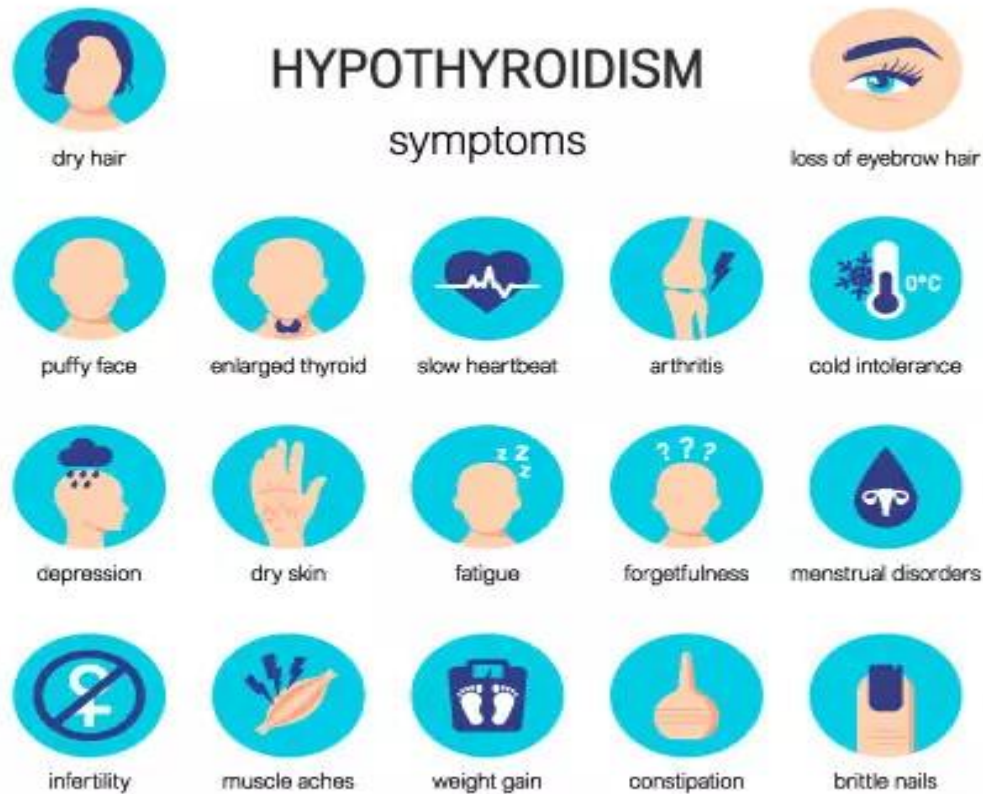


HYPOTHYROIDISM SYMPTOMS

The symptoms of hypothyroidism vary widely; some people have no symptoms, while others have dramatic symptoms or, rarely, life-threatening symptoms.

The symptoms of hypothyroidism are notorious for being nonspecific and for mimicking many of the normal changes of aging. Usually, symptoms are milder when hypothyroidism develops gradually. Symptoms generally are related to the degree of hypothyroidism. Many people with mild hypothyroidism are identified on screening tests for potential hypothyroid symptoms but have few or no symptoms that ultimately are attributed to hypothyroidism or respond to treatment of hypothyroidism. In contrast, people with moderate to severe hypothyroidism are usually symptomatic and improve significantly with thyroid hormone replacement.

The following list of symptoms are those that may be present prior to treatment; people on appropriate treatment should no longer be symptomatic. If symptoms persist, they likely have causes other than hypothyroidism.



General symptoms — Thyroid hormone normally stimulates the metabolism, and most of the symptoms of hypothyroidism reflect slowing of metabolic processes. General symptoms may include fatigue, sluggishness, slight weight gain, and intolerance of cold temperatures.

Skin — Hypothyroidism can decrease sweating. The skin may become dry and thick. The hair may become coarse, eyebrows may become more sparse, and nails may become brittle.

Eyes — Hypothyroidism can lead to mild facial swelling. People who develop hypothyroidism after treatment for Graves' disease may retain some of the eye symptoms of Graves' disease, including protrusion of the eyes, swelling around the eyes, the appearance of staring, and impaired movement of the eyes.

Cardiovascular system — Hypothyroidism slows the heart rate and weakens the heart's contractions, decreasing its overall function. Related symptoms may include fatigue and shortness of breath with exercise. These symptoms may be more severe in people who also have heart

disease. In addition, hypothyroidism can cause mild high blood pressure (the diastolic or second number) and raise blood levels of cholesterol.

Respiratory system — Hypothyroidism weakens the respiratory muscles and decreases lung function. Symptoms can include fatigue, shortness of breath with exercise, and decreased ability to exercise. Hypothyroidism can also lead to swelling of the tongue, hoarse voice, and sleep apnea. Sleep apnea is a condition in which there is intermittent blockage of the airway while sleeping, causing fitful sleep and daytime sleepiness.

Gastrointestinal system — Hypothyroidism slows the actions of the digestive tract, causing constipation. Rarely, the digestive tract may stop moving entirely.

Reproductive system — Women with hypothyroidism often have menstrual cycle irregularities; this commonly involves heavy periods, but some people have absent or infrequent periods.

Irregular periods can make it difficult to get pregnant, and pregnant people with hypothyroidism have an increased risk for early pregnancy loss (miscarriage). For these reasons, it is particularly important to get treatment for hypothyroidism in patients who want to get pregnant.

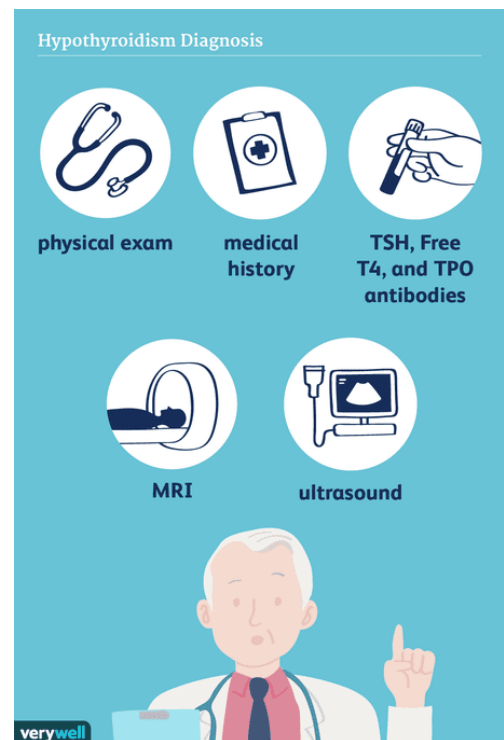
Myxedema coma — In people with severe hypothyroidism, trauma, infection, exposure to the cold, and certain medications can rarely trigger a life-threatening condition called myxedema coma. Symptoms can include hypothermia (low body temperature), sleepiness, and, in severe cases, loss of consciousness.

HYPOTHYROIDISM DIAGNOSIS

Simple blood tests can tell if a person has hypothyroidism. Doctors can order these tests if they suspect a person has hypothyroidism based on their signs and symptoms, or they can use them for screening, ie, to check for thyroid problems in a person with no symptoms.

Blood tests — Blood tests can confirm the diagnosis and pinpoint the underlying cause of the thyroid hormone deficiency:

- The most common blood test for hypothyroidism is thyroid-stimulating hormone (TSH). TSH is the most sensitive test because it can be elevated even with small decreases in thyroid function.
- Thyroxine (T4), the main product of the thyroid gland, may also be measured to confirm and assess the degree of hypothyroidism.



"Overt" hypothyroidism is diagnosed when the TSH is elevated and the T4 is low. "Subclinical" (very mild) hypothyroidism is diagnosed when the TSH is elevated but the T4 is still within the normal reference range for the population.

Routine screening — All newborn babies in the are routinely screened for thyroid hormone deficiency. It is not clear if all adults should be tested for thyroid disease.

HYPOTHYROIDISM TREATMENT

The goal of treatment is to return blood levels of thyroid-stimulating hormone (TSH) and thyroxine (T4) to the normal range and to relieve symptoms.

Hypothyroidism is treated with thyroid hormone replacement therapy. This is usually given as an oral (pill) form of T4, called "levothyroxine." Most people with hypothyroidism need to keep taking levothyroxine for the rest of their life. This gives the body the right level of the hormone that it cannot make on its own.

In most cases, symptoms of hypothyroidism begin to improve within two weeks of starting thyroid replacement therapy. However, people with more severe symptoms, especially muscle pain and weakness, may require several months of treatment before they fully recover.

Tips for taking the medication — Levothyroxine should be taken once per day on an empty stomach (ideally one hour before eating or two to four hours after). Most people take their medication as soon as they wake in the morning and delay eating breakfast as long as practical before leaving for work or school.



Foods with a lot of fiber, calcium- or aluminum-containing antacids, and iron tablets can interfere with the absorption of levothyroxine and should be taken at a different time of day.

It is preferable to stay on the same manufacturer of levothyroxine, if possible, rather than switching between brand name and/or generic formulations. However, if needed to switch to a different formulation of levothyroxine, the dose usually doesn't need to change. If the patient don't feel as well with the new formulation, health care provider can do a blood test to check thyroid hormone levels about six weeks after making the switch. This can help them determine whether the dose needs to be adjusted.

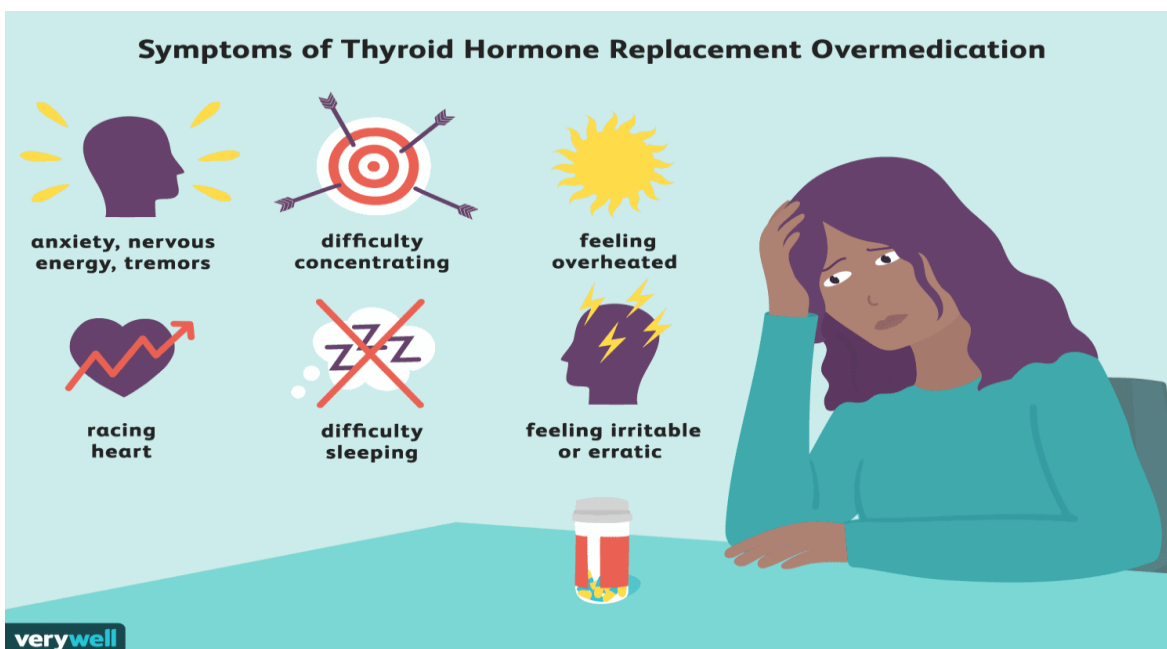
Duration and dose — the health care provider will prescribe an initial dose of levothyroxine and then retest blood level of TSH after six weeks. The dose can be adjusted at that time if needed. This process may need to be repeated several times before hormone levels become normal. Color-coded tablets can help with dose adjustments.

Thyroid hormone makes the heart work a bit harder. For this reason, most health care providers prescribe a lower initial dose of levothyroxine in older adults and in people with coronary artery disease.

Once the optimal dose has been identified, provider may recommend monitoring blood tests once yearly, or more often as needed. Most people with hypothyroidism require lifelong treatment, although the dose of levothyroxine may need to be adjusted over time.

Dose changes — Changes in the levothyroxine dose usually are based upon TSH level. The dose may need to be increased if thyroid disease worsens, getting pregnant, gastrointestinal conditions that impair levothyroxine absorption, or gaining weight.

The dose may need to be decreased while getting older, after childbirth, or if losing weight.



NUTRITION IN HYPERTHYROIDISM

a. Increase selenium intake:

Selenium is a very important trace element for human health. Among all the tissues in the body, the highest concentration of selenium is present in thyroid gland. Selenium is a powerful antioxidant that helps to maintain normal thyroid function by protecting the thyroid gland from reactive oxygen species. Research has also shown that consuming selenium supplements or foods rich in selenium along with anti-thyroid treatment may protect the thyroid gland as well as improve the effect of anti-thyroid treatment.

Foods rich in selenium include:

- Brazil nuts
- Cereals
- Nuts and oil seeds



b. Restrict your sodium intake:

Research has shown that hyperthyroidism is associated with hypertension. A study published in 2007 observed that hyperthyroidism increases the systolic blood pressure and thus, increases the overall blood pressure. Therefore, individuals with overactive thyroid must restrict their sodium intake. Such individuals must always read the food label before buying any food product. The sodium content is always mentioned on the food label and this will help an individual to understand if that food is good for his/her health.

c. Increase intake of calcium:

A recent research published in 2014 has showed that individuals with an overactive thyroid have low bone mineral density and are at an increased risk of fractures. Therefore, it becomes very important for such individuals to increase their intake of calcium rich foods.

Foods rich in calcium include:

- Sesame seeds
- Bok choy
- Finger millets
- Hemp seeds
- Poppy seeds
- Dark green leafy vegetables
- Nuts and oil seeds
- Calcium fortified plant-based food products



d. Eat nutrient-dense meals:

The most common symptom of hyperthyroidism is unexplained weight loss. In order to prevent further weight loss and to promote weight gain, individuals with overactive thyroid should consume nutrient dense meals. Having a healthy diet along with anti-thyroid treatment will surely help to correct the thyroid levels as well as help in weight gain.

e. Include healthy fat:

Research has shown that individuals with hyperthyroidism are at an increased risk of heart disease. In addition to this, the rate of mortality increases if an individual has hyperthyroidism as well as cardiovascular disease. Therefore, it is important to include foods in the daily diet that protect the heart. Besides the quantity of oil, individuals should also pay attention towards the quality of oil. Cooking oil rich in monounsaturated fatty acid (healthy fat) should be included. This includes:

- Olive oil
- Avocado oil

Besides this, individuals with an overactive thyroid should also include whole grains, fruit and vegetables in their daily diet and cut down their sugar intake.

f. Antioxidant rich diet:

Individuals with an overactive thyroid are constantly under oxidative stress. Such an oxidative stress may further cause damage to thyroid gland and deteriorate the condition. Such an increase in the production of reactive oxygen species needs to be controlled. Research has also showed that individuals with hyperthyroidism have poor antioxidant status and thus, it becomes difficult for them to fight against oxidative stress. Therefore, foods rich in antioxidants should be included in the daily diet. These antioxidants scavenge the free radicals and lower oxidative stress.

Foods rich in antioxidants include:

- Berries such as blueberries, cranberries, strawberries, raspberry
- Kiwifruit
- Prunes
- Pulses
- Green tea
- Walnuts
- Pecans
- Beans such as red kidney beans, pinto beans and black bean



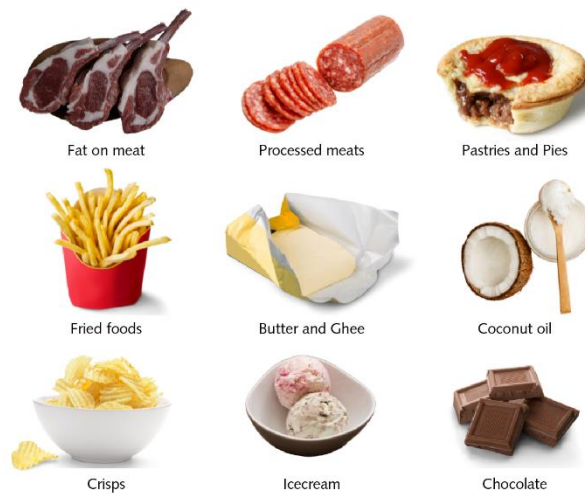
NUTRITION IN HYPOTHYROIDISM

Hypothyroidism dieting plays an auxiliary role in the disease therapy. However, patients with hypothyroidism should eat a diet to treat metabolic disorders.

Diet therapy of hypothyroidism provides for a decrease in the energy value of the daily foods consumption and stimulation of oxidative processes in the body.

To treat the impaired lipid metabolism and hypercholesterolemia, it is important to limit the use of foods rich in cholesterol (animal fats, fatty meats, fish, brains, fish caviar, butter, sour cream, etc.), easily digestible carbohydrates (sugar, honey, jam, flour products, etc.).

Saturated fats to limit



Patients should opt for foods rich in plant fiber (vegetables, unsweetened fruits and berries). It delays the absorption of carbohydrates and promotes bowel evacuation. Due to its large volume, plant fiber gives a sense of saturation at a low energy value. The diet is to include foods and dishes that moderately stimulate gastric secretion, as well as having a laxative effect, namely vegetables, fruits, berries, dried fruits, juices, vegetable oils, sour-milk drinks, bran goods.

Proteins should be consumed in sufficient quantities, since they contribute to an increase in metabolism, having a pronounced specific dynamic effect. It is recommended to limit the use of salt and water; enrich the diet with ascorbic acid; replace regular table salt with iodized one.

It is recommended to make use of one-day lactic acid products (yogurt), prunes, beet juice, rye bread in case of constipation.



Patients with hypothyroidism need to receive a sufficient amount of iodine through an alimentary route. The leaders in iodine content are seafood (seaweed, shrimps, mussels, crabs) and sea fish rich in omega-3 fatty acids (salmon, pink salmon, tuna).

Foods rich in iodine are: iodized salt, seaweed is characterized by high iodine content, sea fish, feijoa.



WHERE TO GET MORE INFORMATION

Your health care provider is the best source of information for questions and concerns related to your medical problem.

We, at Anderson's Hospital, are dedicated to the passionate pursuit of improving the health of the community in Rivers State and the region through the delivery of exceptional and comprehensive quality care to our patients, excellence in education and training, and leadership in innovative research.

Anderson's Hospital is a multi-specialty medical center commissioned in 2023. It has a 66-bed capacity in a highly secured and serene environment in Port Harcourt, Rivers State.



For optimal well-being and privacy of patients and visitors, the Hospital provides multiple fully furnished VIP suites with exclusive lounges.

The care in Anderson's Hospital is provided by a well-trained, highly experienced physician specialists and nurses with both national and international credentials and qualifications. In addition, there is a team of expatriate doctors present on site and via telemedicine which enhances the delivery of the highest standards of care at every moment.

The Hospital is positioned to be one of the top hospitals in Nigeria and is equipped with the most state-of-the-art medical equipment in collaboration with General Electric Healthcare and other



renowned European medical equipment vendors: 1.5 Tesla MRI, 128-slice CT Scan with Coronary Calcium Score Software, Dental Scan, General, Cardiac and Vascular Ultrasound, Combi Cardiac Unit for Invasive and Interventional cardiac and vascular studies, among many others.

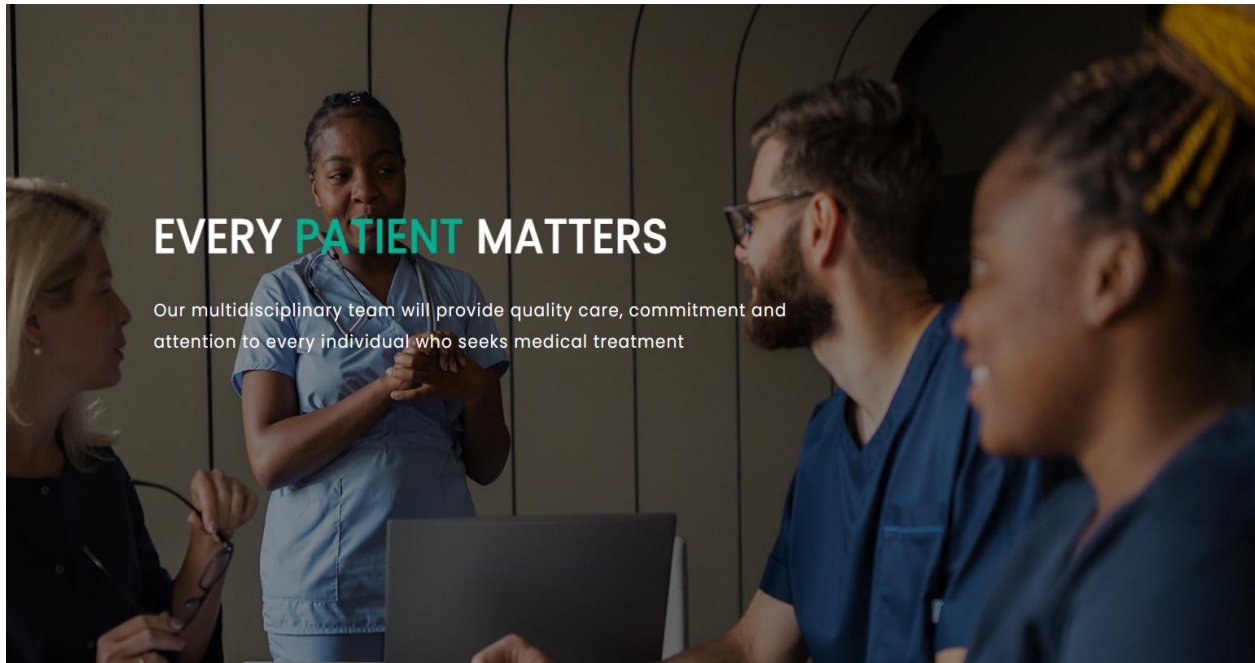
Clinical services include a well-equipped emergency room, 5-bed ICU and 2 state-of-the-art surgical suites. The Hospital is equipped with standard facilities for trauma, stroke and chest pain center designation.

The Hospital endoscopy department is well-equipped for advanced diagnostic/therapeutic procedures, Upper and Lower GI Endoscopies and interventional Bronchoscopy. There is a bespoke Ophthalmology unit with advanced diagnostic/therapeutic equipment, a dedicated Optical shop with all the necessary accessories and a fully equipped Dental clinic for basic care, esthetic and surgical interventions.

Anderson's Hospital has a Laboratory service with fully and semi-automated machines, including Bacteriology and Pathology testing.

For continuous assistance and optimal patient's care, our Hospital has a 24-hours ambulance service, fully equipped with Oxygen, Portable Ventilator, Defibrillator and Monitor led by escort trained Physicians and Nurses.

We can proudly say we are of the best equipped hospitals in the region, a team of well-motivated healthcare professionals with the right attitude and expertise to care for you in the best environment.



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