Everything You Ever Wanted to Know About the Thyroid

(but were afraid to ask…)

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Topics

► Thyroid Nodules
► Hyperthyroidism
► Hypothyroidism
Introduction
FAQ: If I have an issue with my parathyroid, does this affect my thyroid hormone levels?
Thyroid Nodules
Thyroid Nodules

► Thyroid nodules are very common; up to half of all people have at least one nodule, although most do not know about it.

► Most nodules don’t change the amount of thyroid hormone in the body, but some cause the thyroid to make too much hormone. These nodules are very rarely cancerous.

FAQ: Can thyroid nodules decrease the amount of thyroid hormone my body is making?
# Causes of Nodules

<table>
<thead>
<tr>
<th>Benign</th>
<th>Malignant</th>
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<tbody>
<tr>
<td>Multinodular (sporadic) goiter (&quot;colloid adenoma&quot;)</td>
<td>Papillary carcinoma</td>
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<tr>
<td>Hashimoto's (chronic lymphocytic) thyroiditis</td>
<td>Follicular carcinoma</td>
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<tr>
<td>Cysts: colloid, simple, or hemorrhagic</td>
<td>Minimally or widely invasive</td>
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<tr>
<td>Follicular adenomas</td>
<td>Oxyphilic (Hurthle-cell) type</td>
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<td>Follicular adenomas</td>
<td>Medullary carcinoma</td>
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<tr>
<td>Macrofollicular adenomas</td>
<td>Anaplastic carcinoma</td>
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<td>Microfollicular or cellular adenomas</td>
<td>Primary thyroid lymphoma</td>
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<tr>
<td>Hurthle-cell (oxyphil-cell) adenomas</td>
<td>Metastatic carcinoma (breast, renal cell, others)</td>
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<td>Macro- or microfollicular patterns</td>
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Possible Symptoms

► Asymptomatic: found on routine exam or during imaging test performed for another condition

► Difficulty swallowing, voice hoarseness, shortness of breath

► Symptoms from having too much thyroid hormone
Diagnosis

► Normal TSH or high TSH: the next step is to have a thyroid ultrasound and fine needle aspiration biopsy (FNA)

► Additionally, if TSH is high, thyroid antibodies should be checked to look for Hashimoto’s thyroiditis
Diagnosis: Thyroid Ultrasound

- Thyroid ultrasound should be performed on all patients with a suspected nodule or nodular goiter on physical examination or with nodules incidentally noted on other imaging studies (carotid ultrasound, CT, MRI or PET scan).

- Thyroid ultrasonography is used to answer questions about the size and anatomy of the thyroid and nearby structures in the neck.

- Findings can be used to select nodules that require FNA biopsy based on size and features.
Benign Thyroid nodule
Diagnosis: FNA

- Thin needle used to remove small tissue samples from the nodule. Samples are examined with a microscope.

- FNA biopsy can be performed in the office with a local anesthetic (numbing medicine)

- Accurately identifies cancer in a suspicious thyroid nodule. In some cases, the biopsy does not contain enough tissue to make a diagnosis, and surgery is necessary

- Results of the biopsy will be one of the following:
  - Benign (non cancerous)
  - Malignant (cancer)
  - Possible or suspicious for malignancy
  - Non diagnostic or insufficient
Diagnosis: Thyroid Scan

▶ Low TSH: the nodule may be producing high levels of thyroid hormone

▶ The next step is to have a thyroid scan to see if the nodules are producing thyroid hormone
Thyroid Nodule Diagnosis: Thyroid Scan

► Can help determine if a nodule is producing thyroid hormone (i.e., “hot” or “toxic”)

► Performed after swallowing a small dose of a radioactive substance

► Nodules that absorb the substance are usually not cancerous

► Nodules that do not absorb the substance are called “cold,” and have a 5% risk of being cancerous

FAQ: Can a thyroid scan itself cause cancer because of the radioactive iodine?
Thyroid Scan Results

A. Normal

B. Graves' disease

C. Toxic multinodular

D. Toxic adenoma
Treatment: Depends on Type of Nodule

► Watching & waiting – we don’t always treat nodules right away. We will often repeat yearly thyroid ultrasounds to monitor their size.

► Radioactive iodine – comes in a pill or liquid that you swallow. Has a small amount of radiation and can destroy a lot of the thyroid gland. Used only to treat nodules that make too much thyroid hormone.

► Surgery to remove the thyroid nodule – a procedure to drain fluid from the thyroid nodule, if it is filled with fluid.

FAQ: I was placed on synthroid many years ago to shrink the size of my nodule(s). Does this work?
Hyperthyroidism
What is it?

Hyperthyroidism is the medical term for an overactive thyroid (hyper = 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 symptoms.
Symptoms

► Anxiety, irritability, trouble sleeping, even psychosis or depression

► Weakness (particularly the upper arms and thighs, making it difficult to lift heavy items or climb stairs)

► Tremors (of the hands)

► Perspiring more than normal, difficulty tolerating hot weather

► Rapid or irregular heartbeats
Symptoms

► Fatigue

► Weight loss in spite of a normal or increased appetite

► Frequent bowel movements

► 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
Causes: Graves’

► Most common cause of hyperthyroidism

► Not clear why it develops in most people, although it is more common in certain families

► In people with Graves' disease, the immune system produces an antibody that stimulates the thyroid to produce too much thyroid hormone

► Most common in women between the ages of 20-40, but can occur at any age in men or women
Overactive thyroid

- Enlarged thyroid
- Bulging eyes
- Goiter
Hyperthyroidism: Nodules

► 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 toxic nodular goiter
Hyperthyroidism: Thyroiditis

- Painless ("silent" or "lymphocytic") thyroiditis and postpartum thyroiditis are disorders in which the thyroid becomes temporarily inflamed and releases thyroid hormone into the bloodstream, causing hyperthyroidism.

- Postpartum thyroiditis can occur several months after delivery. Symptoms may last for several months, often followed by months of hypothyroid symptoms, such as fatigue, muscle cramps, bloating and weight gain.

- Subacute 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 bloodstream; the hyperthyroidism resolves when the viral infection improves.
Diagnosis

► Low TSH, elevated T4 and T3

► T3 levels are often disproportionately higher than T4 in hyperthyroidism; T3 measurements may be valuable for evaluating and following patients with this disorder.

► Thyroid scan may also be recommended to help determine the cause of hyperthyroidism (Graves' disease, toxic nodular goiter, or thyroiditis)
Thyroid Scan Results

A. Normal
B. Graves' disease
C. Toxic mg
D. Toxic adenoma
E. Thyroiditis
Treatment: Anti-Thyroid Drugs

► Anti-thyroid drugs, such as methimazole 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 PTU.

► These medications can be used:
  – As a short term (4-8 weeks) treatment in people with Graves' disease or toxic nodular goiter, before treatment with radioiodine or surgery.
  – As a long term (1-2 years) treatment for Graves' disease. The disease goes into remission in about 30% of people, and anti-thyroid drugs can be used to control hyperthyroidism while waiting to see if remission occurs.

► People who have very mild Graves' disease may have as high as a 50-70% chance of remission. It is possible to have a relapse years later, and most people will need to eventually consider permanent treatment with radioactive iodine or surgery.
Treatment: Beta- Blockers

► Beta-blockers, such as atenolol, 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 symptoms, such as rapid heart rate, tremors, anxiety and heat intolerance.

► Once the hyperthyroidism is under control (with anti-thyroid drugs, surgery or radioactive iodine), the beta-blocker is stopped.
Treatment: Radioactive Iodine

- Destroying the thyroid with radiation, called radioiodine ablation, is a permanent way to treat hyperthyroidism.

- The amount of radiation used is small and does not cause cancer or infertility.

- Radioiodine is given in liquid or capsule form, and works by destroying much of the thyroid; takes ~6-18 weeks.

- People with severe symptoms, older adults and people with heart problems should first be treated with an anti-thyroid 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.
Treatment: Surgery

► Although surgical removal of the thyroid is a permanent cure for hyperthyroidism, it is used far less often than anti-thyroid drugs or radioactive iodine because of the risks (and expense) associated with thyroid surgery.

► The risks include damage to the nerves of the voice box and parathyroid glands.

► However, surgery is recommended when:
  – A large goiter blocks the airways, making it difficult to breathe.
  – You cannot tolerate anti-thyroid drugs, and you do not want to use radioiodine.
  – There is a nodule in the thyroid gland that could be cancerous.

► Most people develop hypothyroidism after surgery and require treatment with thyroid hormone.
Hypothyroidism
What is it?

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

► In ~95% of cases, hypothyroidism is due to a problem in the thyroid gland itself and is called primary hypothyroidism.

► Rarely, hypothyroidism is a result of decreased production of thyroid-stimulating hormone (TSH) by the pituitary gland.

► Thyroid problems are more common in women, increase with age and are more common in whites and Mexican Americans than in blacks.
Symptoms
Symptoms

- Decreased sweating, thick skin, coarse or thin hair, brittle nails
- Mild swelling around the eyes
- Slowed heart rate and decreased overall cardiac function leading to fatigue and shortness of breath with exercise
- Mild high blood pressure and elevated cholesterol
- Tongue swelling, hoarse voice, and sleep apnea
Symptoms

► Constipation

► Absent or infrequent periods to very frequent and heavy periods

► 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, which causes a loss of consciousness and hypothermia (low body temperature)
Diagnosis

► **Blood tests** – 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

**FAQ:** Why aren’t you checking my T3 levels?
Goal of hypothyroidism treatment is to return blood levels of TSH and T4 to the normal range and to alleviate symptoms.

Treatment for hypothyroidism is thyroid hormone replacement therapy, usually given as an oral form of T4.

T4 should be taken 1x per day on an empty stomach (1 hour before eating or 2 hours after). Generic (levothyroxine) and brand-name (Synthroid®, Levoxyl®, Levothroid®, Unithyroid®) formulations are equally effective.

However, it is preferable to stay on the same type of T4 rather than switch between brand name and/or generic formulations.
Treatment

► If a switch is necessary, a blood test is usually done 6 weeks later to determine if the dose needs to be adjusted. Color-coded tablets can help with dose adjustments.

► Some clinicians prescribe another form of thyroid hormone, triiodothyronine (T3) in combination with T4. However, since T4 is converted into T3 in other organs, most studies have not shown an advantage of combination T3 & T4 therapy over T4 alone.
Treatment

► In most cases, symptoms begin to improve within 2 weeks of starting thyroid replacement therapy. However, people with more severe symptoms may require several months of treatment before they fully recover.

FAQ: All the chat sites recommend Armour® thyroid. Why don’t you?

FAQ: Why can’t I treat my hypothyroidism with iodine?
Q&A

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