Anatomy Gallery: Endocrine System [2]
Explore our 3D interactive tour of the endocrine system.

The thyroid makes hormones that help regulate your metabolism, heart rate, blood pressure, and body temperature. The amount of thyroid hormone released by the thyroid is regulated by the pituitary gland at the base of your brain. This gland makes a substance called **thyroid-stimulating hormone (TSH)**.

Having too much thyroid hormone (**hyperthyroidism**) can cause a fast or irregular heartbeat, trouble sleeping, nervousness, hunger, weight loss, and a feeling of being too warm.

Having too little hormone (**hypothyroidism**) causes you to slow down, feel tired, and gain weight.

The thyroid gland has 2 main types of cells:

- **Follicular cells** use iodine from the blood to make thyroid hormones. These hormones help regulate your metabolism.
- **C cells** (also called **parafollicular cells**) make calcitonin, a hormone that helps control how your body uses calcium.

Other, less common cells in the thyroid gland include immune system cells (lymphocytes) and supportive (stromal) cells.

Different types of thyroid cancer can develop from each kind of cell.

Many types of growths and tumors can develop in the thyroid gland. Most of these are **benign** (non-cancerous), but others are **malignant** (cancerous), which means they can spread into nearby tissues and to other parts of the body

Thyroid conditions that are usually benign

Changes in your thyroid gland's size or shape can often be felt, or even seen, by you or your doctor. Most often, these changes are benign (not cancer).

Thyroid enlargement

An enlarged thyroid gland is sometimes called a **goiter**. Some goiters are diffuse, meaning that the whole gland is large. Other goiters are nodular, meaning that the gland

is large and has one or more nodules (bumps) in it.

There are many reasons the thyroid gland might be larger than usual. Most of the time it isn't from cancer.

Goiters (both diffuse and nodular) are usually caused by an imbalance in certain hormones. For example, not getting enough iodine in your diet can affect your hormone levels and cause a goiter.

Thyroid nodules

Lumps or bumps in the thyroid gland are called **thyroid nodules**. Most thyroid nodules are benign, but a small percentage are cancer. You can develop thyroid nodules at any age, but it happens most often in older adults.

Some nodules cause the body to make too much thyroid hormone, which can lead to hyperthyroidism. These nodules are almost always benign.

A small portion of adults have thyroid nodules that can be felt by a doctor. But many more people have nodules that are too small to feel. These might only be seen on a test such as an ultrasound.

Most thyroid nodules are cysts filled with fluid or with a stored form of thyroid hormone called **colloid**. Other nodules are solid, with very little fluid or colloid. Solid nodules are more likely to be cancer. Still, most solid nodules are not cancerous.

Some types of solid nodules (such as hyperplastic nodules and adenomas) have too many cells, but the cells are not cancer cells.

Benign thyroid nodules can sometimes just be watched closely, as long as they aren't growing or causing symptoms. Others might need some form of treatment.

Types of thyroid cancer

The main types of thyroid cancer are:

- Differentiated (including papillary, follicular, and oncocytic carcinoma)
- Medullary
- Anaplastic

Differentiated thyroid cancers

Most thyroid cancers are differentiated cancers. The cells in these cancers look a lot like normal thyroid cells when seen in the lab. These cancers develop from thyroid follicular cells.

Papillary thyroid cancer

Papillary thyroid cancer (also called **papillary carcinoma** or **papillary adenocarcinoma**) is the most common type. About 8 out of 10 thyroid cancers are papillary cancers.

These cancers tend to grow very slowly and usually develop in only one lobe of the thyroid gland. They sometimes spread to the lymph nodes in the neck. But even when this happens, they can often be treated successfully and are rarely fatal.

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About 3% of thyroid cancers are oncocytic carcinoma of the thyroid (previously called **Hürthle (Hurthle) cell cancer**). This type of thyroid cancer tends to be harder to find

Less common thyroid cancers

Other rare cancers found in the thyroid include:

- Thyroid lymphoma
  Thyroid sarcoma

Asban A, Patel AJ, Reddy S, Wang T, Balentine CJ, Chen H. Chapter 68: Cancer of the Endocrine System. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa. Elsevier: 2020.[4]

Fuleihan GE, Arnold A. Parathyroid carcinoma. UpToDate. 2024. Accessed at https://www.uptodate.com/contents/parathyroid-carcinoma on February 6, 2024.

National Cancer Institute. Thyroid Cancer Treatment (PDQ®)–Health Professional Version. 2023. Accessed at https://www.cancer.gov/types/thyroid/hp/thyroid-treatment-pdq on February 6, 2024.

Ross DS. Diagnostic approach to and treatment of thyroid nodules. UpToDate. 2024. Accessed at https://www.uptodate.com/contents/diagnostic-approach-to-and-treatment-of-thyroid-nodules on February 7, 2024.

Tuttle RM. Papillary thyroid cancer: Clinical features and prognosis. UpToDate. 2024. Accessed at https://www.uptodate.com/contents/papillary-thyroid-cancer-clinical-features-and-prognosis on February 6, 2024.

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Key Statistics for Thyroid Cancer

The information below is an overview of the latest statistics for thyroid cancer.

How common is thyroid cancer?

The American Cancer Society's most recent estimates for thyroid cancer in the United States are for 2024:

- About 44,020 new cases of thyroid cancer (12,500 in men and 31,520 in women)
- About 2,170 deaths from thyroid cancer (990 in men and 1,180 in women)

Thyroid cancer is often diagnosed at a younger age than most other adult cancers. The average age when a person is diagnosed with thyroid cancer is 51.

This cancer is almost 3 times more common in women than in men. It is about 40% to 50% less common in Black people than in any other racial or ethnic group.

Trends in thyroid cancer statistics

Until recently, the rate of new thyroid cancers was growing faster than for any other cancer in the US.

This was largely because more thyroid tumors were being found during imaging tests such as CT or MRI scans that were done for other medical problems. These sensitive tests can sometimes detect small thyroid tumors that might not ever have been found otherwise (and many of which might never have caused any problems).

However, as doctors have started to use stricter criteria for diagnosing thyroid cancer, the incidence rate has declined by about 2% each year since 2014.

The death rate for thyroid cancer has stayed about the same since 2009.

Learn more

- Statistics on survival rates for thyroid cancer are discussed in Survival Rates for Thyroid Cancer[1].
- Visit the American Cancer Society's Cancer Statistics Center[2] for more key statistics.

Hyperlinks

1. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/detection-diagnosis-staging/survival-rates.html
2. cancerstatisticscenter.cancer.org/

References

American Cancer Society. *Cancer Facts & Figures 2024*. Atlanta: American Cancer

Society; 2024.

National Cancer Institute. SEER Cancer Stat Facts: Thyroid Cancer. 2024. Bethesda, MD. Accessed at https://seer.cancer.gov/statfacts/html/thyro.html on February 7, 2024.

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What's New in Thyroid Cancer Research?

Important research into thyroid cancer is being done in many university hospitals, medical centers, and other institutions around the world. Each year, scientists learn more about what causes thyroid cancer, how to find it, and how to improve treatment.

The information below is an overview of the latest research into thyroid cancer, including genetics, detection and diagnosis, and treatments.

Genetics

Researchers have discovered the genetic causes of familial (inherited) medullary thyroid cancer. Because of this, it is now possible to identify family members who carry the abnormal *RET* gene that causes this type of cancer, and to remove the thyroid gland before cancer can develop there.

Understanding the abnormal genes that cause sporadic (not inherited) thyroid cancer has also led to better treatments. In fact, treatments that target some of these gene changes are already being used, and more are being developed (see below).

Detection and diagnosis

Many thyroid lumps turn out not to be cancer. But doctors can't always tell which ones

are likely to be cancer based on exams and commonly used tests, such as an ultrasound of the neck. Even some thyroid biopsies (in which small pieces of the lump are removed and looked at under a microscope) can't always tell if a lump is cancer or not. Because of this, some people might end up having their thyroid removed even if they don't have thyroid cancer.

Researchers are now studying newer tests that look at the gene patterns inside the cells removed during a biopsy. They want to see if these tests can help determine if someone has thyroid cancer, and possibly even how that person's cancer should be treated

Treatment

Most thyroid cancers can be treated successfully with surgery[1], along with radioactive iodine (RAI) therapy[2] if needed. But more advanced cancers can be hard to treat, especially if they don't respond to RAI therapy. Doctors and researchers are looking for new ways to treat thyroid cancer that are more effective and lead to fewer side effects.

Active surveillance for some low-risk thyroid cancers

Until fairly recently, the number of people diagnosed with thyroid cancer in the US had been rising rapidly. Much of this was because of the increased use of thyroid ultrasound, which can detect small thyroid nodules that might not otherwise have been found in the past.

Studies have suggested that some newly found, very small thyroid cancers (known as **microcarcinomas**) may not need to be treated right away. Instead, they can be safely watched and then treated only if they start to grow or show other concerning signs.

This might now be an option for some people with these cancers. Ongoing clinical trials are looking to better define which tumors can be safely watched this way.

Non-surgical treatments to destroy thyroid tumors

Surgery is a common treatment for thyroid cancer, and it's often very effective. But it can also lead to lifelong side effects, particularly when the ceds6u____.aa o.cult2d ca4g ET BT 1 0 0 1

experimental at this time.

For example, researchers are studying if **microwave ablation (MWA)** or **radiofrequency ablation (RFA)** can offer similar results to surgery in the treatment of small papillary thyroid cancers. In these techniques, a thin probe is inserted through the skin into the tumor to heat and destroy it.

Radioactive iodine (RAI) therapy

Researchers are looking for ways to make RAI effective against more thyroid cancers.

For example, in some thyroid cancers, the cells have changes in the *BRAF* gene, which may make them less likely to respond to RAI therapy. Researchers are studying whether new drugs that target the *BRAF* pathway can be used to make thyroid cancer cells more likely to take up radioactive iodine. These types of drugs might be useful for people who have advanced cancer that is no longer responding to RAI therapy.

Newer medicines to treat thyroid cancer

In the past, advanced thyroid cancers that weren't responding to RAI treatment were often treated with chemotherapy (chemo). Unfortunately, most thyroid cancers don't respond well to chemo. But newer types of medicines have become available in recent years, and others are now being studied.

Targeted therapy drugs

In recent years, doctors have started using newer, targeted drugs[3] to treat thyroid cancer. Unlike standard chemo drugs, which work by attacking rapidly growing cells (including cancer cells), targeted drugs attack specific parts of cancer cells.

Targeted drugs for thyroid cancer attack some of the gene and protein changes inside the cancer cells. These changes are what make thyroid cancer cells different from normal cells.

Targeted drugs have become an important part of treatment for many advanced thyroid cancers, as they generally work better than chemo drugs. New targeted drugs are also being developed and tested.

Immunotherapy

Immunotherapy is the use of medicines to help the body's own immune system find and

attack cancer cells. This approach has become an important part of the treatment of many types of cancer. It might also be helpful in treating some thyroid cancers.

For example, immunotherapy medicines known as checkpoint inhibitors[4] can often help boost the immune system response against cancer cells anywhere in the body. These drugs might be useful for people whose thyroid cancer cells have certain changes, such as having many gene mutations.

These and other types of immunotherapy are being studied to see how they might assist in treating other thyroid cancers.

Hyperlinks

1. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/treating/surgery.html
2. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/treating/radioactive-iodine.html
3. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/treating/targeted-therapy.html
4. www.cancer.orgamericancancer.sharepoint.com/cancer/managing-cancer/treatment-types/immunotherapy/immune-checkpoint-inhibitors.html

References

American Thyroid Association. Microcarcinomas of the Thyroid Gland. Accessed at https://www.thyroid.org/microcarcinomas-thyroid-gland/ on April 29, 2024.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Thyroid Carcinoma. V.2.2024. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/thyroid.pdf on April 27, 2024.

van Dijk SPJ, Coerts HI, Gunput STG, et al. Assessment of radiofrequency ablation for papillary microcarcinoma of the thyroid: A systematic review and meta-analysis. *JAMA Otolaryngol Head Neck Surg*. 2022;148(4):317-325.

Zhao ZL, Wang SR, Dong G, et al. Microwave ablation versus surgical resection for US-detected multifocal T1N0M0 papillary thyroid carcinoma: A 10-center study. *Radiology*. 2024;311(1):e230459.

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