

MEDULLARY THYROID CANCER

Medullary Thyroid Cancer (ATA)

Cancer of the Thyroid (ATA)

Thyroid cancer is relatively uncommon compared to other cancers. In the United States it is estimated that in 2016 approximately 64,000 new patients will be diagnosed with thyroid cancer, compared to over 240,000 patients with breast cancer and 135,000 patients with colon cancer. However, fewer than 2000 patients die of thyroid cancer each year. In 2013, the last year for which statistics are available, over 630,000 patients were living with thyroid cancer in the United States. Thyroid cancer is usually very treatable and is often cured with surgery (see *Thyroid Surgery brochure*) and, if indicated, radioactive iodine (see *Radioactive Iodine brochure*). Even when thyroid cancer is more advanced, effective treatment is available for the most common forms of thyroid cancer. Even though the diagnosis of cancer is terrifying, the prognosis for most patients with *papillary and follicular thyroid cancer* is usually excellent.

Medullary Thyroid Cancer (ATA)

Medullary Thyroid Cancer (MTC) accounts for 1%– 2% of thyroid cancers in the United States. MTC is different from other types of thyroid cancers (which are derived from thyroid follicular cells – the cells that make thyroid hormone), because it originates from the parafollicular C cells (also called “C cells”) of the thyroid gland. These cells do not make thyroid hormone and instead make a different hormone called calcitonin.

MTC can, and frequently does, spread to lymph nodes and can also spread to other organs. MTC is likely to run in families (inherited forms) in up to 25% of diagnoses, and inherited forms can be associated with other endocrine tumors, in syndromes called Multiple Endocrine Neoplasia (MEN) 2A and MEN 2B. In addition to MTC, patients with MEN2A may have tumors of the adrenal glands called pheochromocytomas or in the parathyroid glands (parathyroid adenomas). Patients with MEN2B, have MTC, pheochromocytomas and neuromas (typically a benign growth or tumor of nerve tissue) in the lining of the mouth and/ or gastrointestinal track.

Patients with an inherited form of MTC usually have a mutation in a gene called the RET proto-oncogene. This mutation is present in all of the cells in their body (a germline mutation) and these mutations cause the development of MTC. This is important because in family members of a person with an inherited form of MTC, a blood test for a mutation in the RET protooncogene can lead to an early diagnosis of MTC and, to curative surgery to remove it. However, in most patients (~ 75%) a germline mutation is not found – indicating that MTC is not an inherited or inheritable condition. In these cases, MTC is called sporadic.

Whether MTC is sporadic or familial can be determined by a blood test for the RET protooncogene. Anyone diagnosed with MTC should have this test run to determine whether the MTC is familial (meaning other family members may also have MTC that has not yet been diagnosed) or sporadic.

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(Association, 2020) (Association, 2020)

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Other imaging tests. You may have one or more imaging tests to help your doctor determine whether your cancer has spread beyond the thyroid. Imaging tests may include CT, MRI and nuclear imaging tests that use a radioactive form of iodine. 9

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Medullary thyroid cancer usually presents as a lump or nodule in the thyroid. It may be noted by the patient or discovered during routine neck examination by the doctor. Sometimes, the nodule is discovered incidentally by imaging studies done for other unrelated reasons (CT of the neck, PET scan, or carotid ultrasound). The nodule may cause no symptoms, but in some cases the tumor may have spread to lymph nodes in the neck, which may be enlarged on physical examination.

Patients with advanced MTC may complain of pain in the neck, jaw, or ear. If a nodule is large enough to compress the windpipe or the esophagus, it may cause difficulty with breathing or swallowing. Hoarseness can be present if the cancer invades the nerve that controls the vocal cords.

MTC is usually more aggressive than the other more common types of thyroid cancer (See *Thyroid Cancer papillary and follicular brochure*), and it is usually easier to treat and control if it is found before it spreads to lymph nodes in the neck or other parts of the body. Thyroid function tests such as TSH are usually normal, even when MTC is present. If you have a family history of MTC and have tested positive for the RET mutation, then you should see an endocrinologist to help determine how best to follow you or treat you.

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How is Medullary Thyroid Cancer Diagnosed (ATA)

A diagnosis of thyroid cancer is usually made by a *fine needle aspiration (FNA) biopsy* of a thyroid nodule, or after the nodule is surgically removed. Patients in whom the results of an FNA biopsy (or histopathology) are suggestive or indicative of MTC should be further evaluated with measurement of the proteins calcitonin and carcinoembryonic antigen (CEA) in the blood, which are typically elevated in patients with MTC. These tests are useful to confirm the diagnosis of MTC which can help ensure the surgeon plans the correct surgery, and also serve as tumor markers during long-term follow-up to detect any remaining disease or recurrence of the cancer.

WHAT IS THE RET MUTATION? (ATA)

The RET proto-oncogene is located on chromosome 10. A genetic mutation in the RET oncogene is seen in all cells in the body in patients with the hereditary forms of MTC. Mutations in RET can also be seen only in the tumor cells in patients with sporadic MTC. Since the discovery of the RET oncogene, more than 100 different mutations have been identified in the gene in patients with MTC.

Genetic counseling and testing for RET gene mutations should be offered to patients diagnosed with MTC and first-degree relatives (parents, siblings and children of someone diagnosed with MTC) of all patients with proven germline mutations (hereditary MTC). If close relatives, especially children, are found to have the RET mutation on a blood test, the thyroid gland can be removed before MTC has a chance to develop or at least in its very early stages.

How is MTC Treated? (ATA)

The primary treatment for MTC is surgery, and the currently accepted approach is to remove the entire thyroid gland (total thyroidectomy) (See *thyroid surgery brochure*). Often patients with MTC will have thyroid cancer present in the lymph nodes of the neck or upper chest. These lymph nodes are usually removed at the time of thyroid surgery or sometimes, at a later surgery if found subsequently. After surgery, patients need to take thyroid hormone replacement medication for life.

Unlike papillary and follicular thyroid cancer, medullary thyroid cancer does not take up iodine, and consequently radioactive iodine treatment is not a treatment option for patients with MTC.

Patients with MTC with very high levels of calcitonin should have imaging prior to surgery to determine whether the tumor has spread to sites outside the thyroid and/or outside the neck. If there is evidence of cancer outside the neck, surgery may be more palliative, aimed at reducing local complications caused by the tumor, rather than completely eliminating all

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tumor. Other treatment options (external beam radiation, or chemotherapy) may need to be used together with surgery after careful discussion with the patient.

New chemotherapeutic agents that have shown promise treating other advanced cancers are increasingly available for treatment of thyroid cancers. Two such agents, Vandetanib and Cabozantinib have been FDA approved for use by patients with MTC. These drugs do not cure advanced cancers that have spread widely throughout the body, but they can often slow down or partially reverse the growth of the cancer. These treatments are usually given by an oncologist (cancer specialist) and require care at specialized medical centers.

WHAT IS THE PROGNOSIS OF MEDULLARY THYROID CANCER? (ATA)

The prognosis of MTC is usually not as favorable as differentiated thyroid cancers (*papillary and follicular cancer*). However, if discovered early, surgery can be curative. Even in cases where it is not caught early, MTC often progresses relatively slowly. Long-term survival depends on the stage of disease at the time of diagnosis. The blood levels of calcitonin or CEA over the first year after surgery can also be a predictor of a patient's survival.

Thyroid Carcinoma (MTC) Registry Consortium (ATA)

[Home](#) » [Professionals Portal](#) » [Partner Relations](#) » [Medullary Thyroid Carcinoma \(MTC\) Registry Consortium](#)

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The Medullary Thyroid Carcinoma (MTC) Registry Consortium*(ATA)

The Medullary Thyroid Carcinoma (MTC) Registry Consortium* is partnering with the American Thyroid Association® (ATA) to create a registry (list) of all new cases of MTC diagnosed in the United States over the next 10-15 years (the MTC Registry). The purpose of the MTC Registry is to help better understand what risk factors are associated with the development of MTC.

The ATA® was asked to monitor the development of the registry by the U.S. Food and Drug Administration so that the MTC Registry Consortium would have an independent, professional medical society involved. Select ATA member experts have been asked to provide their experience and knowledge related to medullary thyroid cancer. The ATA® has no oversight or management over the registry or study. The ATA's involvement is to provide thyroid cancer expertise only. Please be assured that the MTC Registry adheres to all Health Insurance Portability and Accountability Act (HIPAA) related regulations in protecting your medical information.

Medullary thyroid cancer is a rare neuroendocrine tumor that arises from the parafollicular calcitonin producing C-cells in the thyroid gland. The cause of medullary thyroid cancer is known in about 25% of cases which develop as a result of a RET oncogene mutation in the setting of multiple endocrine neoplasia syndromes. However, the cause of medullary thyroid cancer is unknown in the remaining 75% of patients.

Risk factors being evaluated by the MTC registry include the patient's family history of cancer, results of genetic testing, radiation exposure, lifestyle factors (such as smoking and alcohol use), and other medical conditions (such as diabetes, hypothyroidism, hyperthyroidism and obesity). Since one of the



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primary goals of the MTC Registry is to determine if some of the medicines used to treat diabetes or weight management could possibly be associated with the development of MTC, a study is being conducted to help collect this data. Patients who to participate in this study may be asked to provide information on certain medications that they have used prior being diagnosed with MTC.

The patient's participation in the study is completely voluntary. The patient's decision whether to participate will not affect his or her ability to receive medical care. There are no medical tests or doctor visits needed to participate. Participation in the study involves only completing surveys which usually take about 20-30 minutes by phone. As noted above, the purpose of this project is simply to collect data to better understand risk factors associated with the development of MTC. Potential study participants will be contacted by the MTC registry team directly, not by the ATA. Potential study participants not wanting to participate can contact the United BioSource Corporation (UBC) team at the number listed below to prevent additional contact attempts.

While the ATA® is providing expertise in thyroid cancer, the MTC Registry and patient survey is being funded by a group of pharmaceutical companies (MTC Registry Consortium) and is being managed by a private clinical research organization, UBC, on behalf of the participating pharmaceutical companies.

How to Join the Registry (ATA)

If you have been asked to participate and are interested or have any questions about the study, please contact the MTC Registry team at UBC toll-free at 877-739-2576, Monday through Friday between 9:00 am and 5:00 pm Central time.

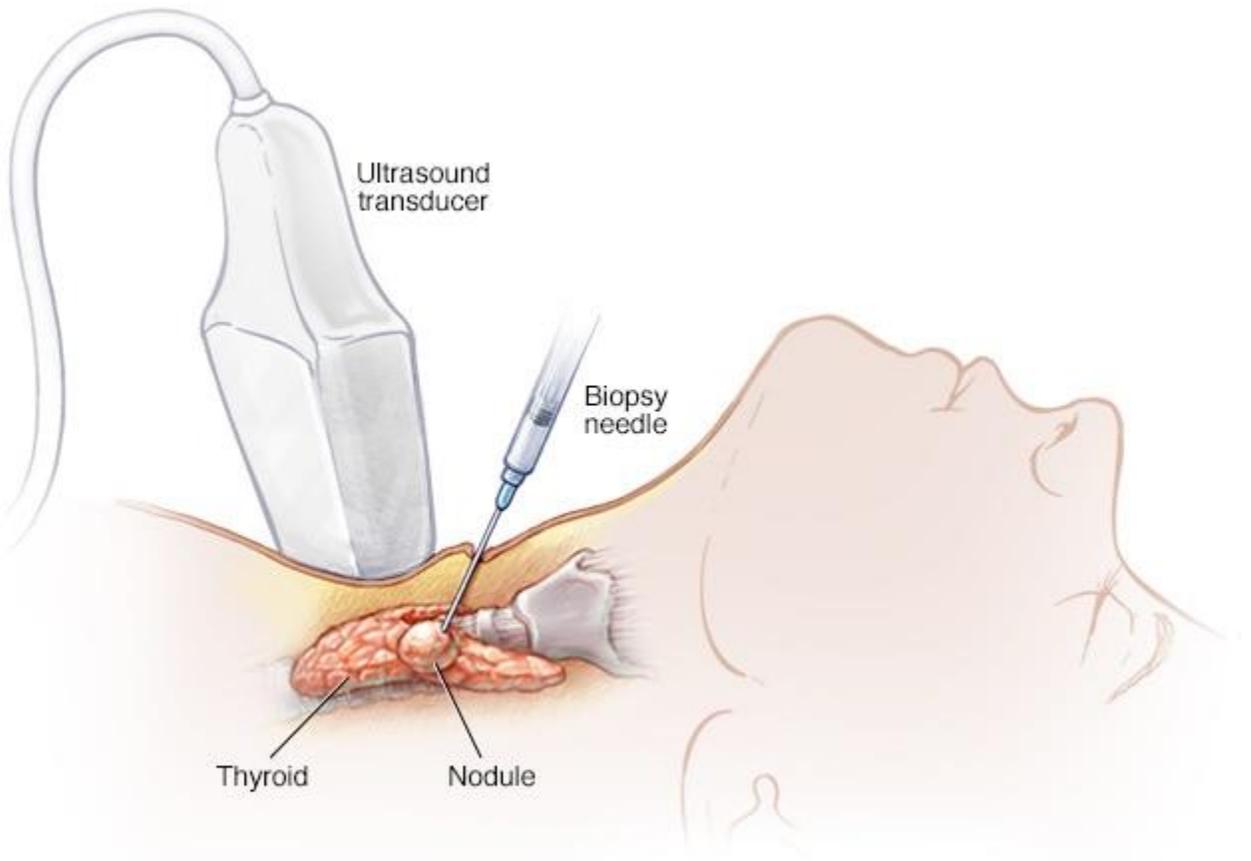
** Disclaimer: Medullary Thyroid Carcinoma (MTC) Registry Consortium current member sponsors include Novo Nordisk, AstraZeneca, Eli Lilly and GlaxoSmithKline.*

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Diagnosis of Medullary Thyroid Cancer (MAYO CLINIC)



Diagnosis Of Medullary Thyroid Cancer (Mayo Clinic)



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Needle biopsy

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Thyroid biopsy

Needle biopsy

During needle biopsy, a long, thin needle is inserted through the skin and into the suspicious area. Cells are removed and analyzed to see if they are cancerous.

Tests and procedures used to diagnose thyroid cancer include:(Mayo Clinic)

Physical exam. Your doctor will examine your neck to feel for physical changes in your thyroid, such as thyroid nodules. He or she may also ask about your risk factors, such as past exposure to radiation and a family history of thyroid tumors.

Blood tests. Blood tests help determine if the thyroid gland is functioning normally.

Ultrasound imaging. Ultrasound uses high-frequency sound waves to create pictures of body structures. To create an image of the thyroid, the ultrasound transducer is placed on your lower neck. The appearance of your thyroid on the ultrasound helps your doctor determine whether a thyroid nodule is likely to be noncancerous (benign) or whether there's a risk that it might be cancerous.

Removing a sample of thyroid tissue. During a fine-needle aspiration biopsy, your doctor inserts a long, thin needle through your skin and into the thyroid nodule. Ultrasound imaging is typically used to precisely guide the needle into the nodule. Your doctor uses the needle to remove samples of suspicious thyroid tissue. The sample is analyzed in the laboratory to look for cancer cells.

Other imaging tests. You may have one or more imaging tests to help your doctor determine whether your cancer has spread beyond the thyroid. Imaging tests may include CT, MRI and nuclear imaging tests that use a radioactive form of iodine.

Genetic testing. Some people with medullary thyroid cancer may have genetic changes that can be associated with other endocrine cancers. Your family history may prompt your doctor to recommend genetic testing to look for genes that increase your risk of cancer.

More Information (Mayo Clinic)

- [Thyroid cancer care at Mayo Clinic](#)

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Ultrasound

Treatment (Mayo Clinic)

Your thyroid cancer treatment options depend on the type and stage of your thyroid cancer, your overall health, and your preferences.

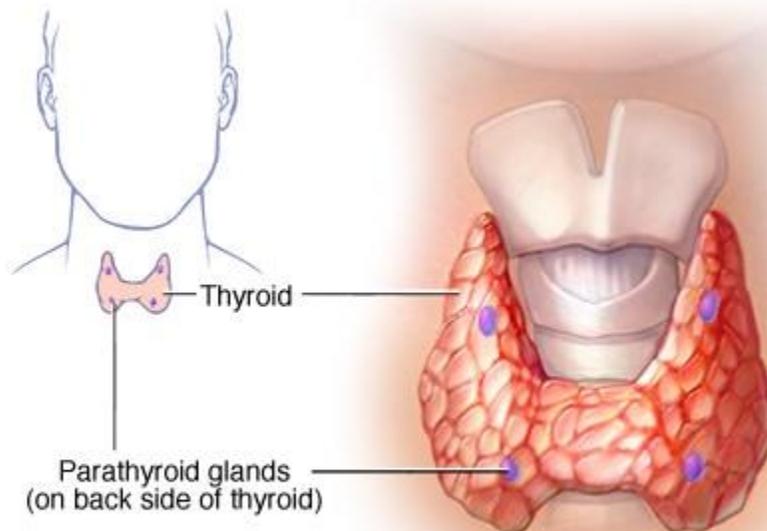
Most thyroid cancers can be cured with treatment.

Treatment may not be needed right away

Very small thyroid cancers that have a low risk of spreading in the body might not need treatment right away. Instead, you might consider active surveillance with frequent monitoring of the cancer. Your doctor might recommend blood tests and an ultrasound exam of your neck once or twice per year.

In some people, the cancer might never grow and never require treatment. In others, growth may eventually be detected and treatment can be initiated.

Surgery (Mayo Clinic)



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Parathyroid glands Parathyroid glands

The parathyroid glands, which lie behind the thyroid, manufacture the parathyroid hormone, which plays a role in regulating your body's levels of the minerals calcium and phosphorus.

Most people with thyroid cancer undergo surgery to remove the thyroid. Which operation your doctor might recommend depends on the type of thyroid cancer, the size of the cancer, whether the cancer has spread beyond the thyroid and the results of an ultrasound exam of the entire thyroid gland.

Operations used to treat thyroid cancer include:

- **Removing all or most of the thyroid (thyroidectomy).** An operation to remove the thyroid gland might involve removing all of the thyroid tissue (total thyroidectomy) or most of the thyroid tissue (near-total thyroidectomy). The surgeon often leaves small rims of thyroid tissue around the parathyroid glands to reduce the risk of damage to the parathyroid glands, which help regulate the calcium levels in your blood.
- **Removing a portion of the thyroid (thyroid lobectomy).** During a thyroid lobectomy, the surgeon removes half of the thyroid. It might be recommended if you have a slow-growing thyroid cancer in one part of the thyroid and no suspicious nodules in other areas of the thyroid.
- **Removing lymph nodes in the neck (lymph node dissection).** When removing your thyroid, the surgeon may also remove nearby lymph nodes in the neck. These can be tested for signs of cancer.

Thyroid surgery carries a risk of bleeding and infection. Damage to your parathyroid glands also can occur during surgery, which can lead to low calcium levels in your body.

There's also a risk that the nerves connected to your vocal cords might not work normally after surgery, which can cause vocal cord paralysis, hoarseness, voice changes or difficulty breathing. Treatment can improve or reverse nerve problems.

Thyroid hormone therapy (Mayo Clinic)

After thyroidectomy, you may take the thyroid hormone medication levothyroxine (Levoxyl, Synthroid, others) for life.

This medication has two benefits: It supplies the missing hormone your thyroid would normally produce, and it suppresses the production of thyroid-stimulating hormone (TSH) from your pituitary gland. High TSH levels could conceivably stimulate any remaining cancer cells to grow.

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Radioactive iodine (Mayo Clinic)

Radioactive iodine treatment uses large doses of a form of iodine that's radioactive.

Radioactive iodine treatment is often used after thyroidectomy to destroy any remaining healthy thyroid tissue, as well as microscopic areas of thyroid cancer that weren't removed during surgery. Radioactive iodine treatment may also be used to treat thyroid cancer that recurs after treatment or that spreads to other areas of the body.

Radioactive iodine treatment comes as a capsule or liquid that you swallow. The radioactive iodine is taken up primarily by thyroid cells and thyroid cancer cells, so there's a low risk of harming other cells in your body.

Side effects may include:

- Dry mouth
- Mouth pain
- Eye inflammation
- Altered sense of taste or smell
- Fatigue

Most of the radioactive iodine leaves your body in your urine in the first few days after treatment. You'll be given instructions for precautions you need to take during that time to protect other people from the radiation. For instance, you may be asked to temporarily avoid close contact with other people, especially children and pregnant women.

External radiation therapy (Mayo Clinic)

Radiation therapy can also be given externally using a machine that aims high-energy beams, such as X-rays and protons, at precise points on your body (external beam radiation therapy). During treatment, you lie still on a table while a machine moves around you.

External beam radiation therapy may be recommended if surgery isn't an option and your cancer continue to grow after radioactive iodine treatment. Radiation therapy may also be recommended after surgery if there's an increased risk that your cancer will recur.

Chemotherapy (Mayo Clinic)

Chemotherapy is a drug treatment that uses chemicals to kill cancer cells. Chemotherapy is typically given as an infusion through a vein. The chemicals travel throughout your body, killing quickly growing cells, including cancer cells.

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Chemotherapy isn't commonly used in the treatment of thyroid cancer, but it's sometimes recommended for people with anaplastic thyroid cancer. Chemotherapy may be combined with radiation therapy.

Targeted drug therapy (Mayo Clinic)

Targeted drug treatments focus on specific abnormalities present within cancer cells. By blocking these abnormalities, targeted drug treatments can cause cancer cells to die.

Targeted drug therapy for thyroid cancer targets the signals that tell cancer cells to grow and divide. It's typically used in advanced thyroid cancer.

Injecting alcohol into cancers

Alcohol ablation involves injecting small thyroid cancers with alcohol using imaging such as ultrasound to ensure precise placement of the injection. This procedure causes thyroid cancers to shrink.

Alcohol ablation might be an option if your cancer is very small and surgery isn't an option. It's also sometimes used to treat cancer that recurs in the lymph nodes after surgery.

Supportive (palliative) care (Mayo Clinic)

Palliative care is specialized medical care that focuses on providing relief from pain and other symptoms of a serious illness. Palliative care specialists work with you, your family and your other doctors to provide an extra layer of support that complements your ongoing care.

Palliative care can be used while undergoing other aggressive treatments, such as surgery, chemotherapy or radiation therapy. Increasingly, it's being offered early in the course of cancer treatment.

When palliative care is used along with all of the other appropriate treatments, people with cancer may feel better and live longer.

Palliative care is provided by a team of doctors, nurses and other specially trained professionals. Palliative care teams aim to improve quality of life for people with cancer and their families.

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[More Information\(Mayo Clinic\)](#)

[Thyroid cancer care at Mayo Clinic](#)

[Chemotherapy \(Mayo Clinic\)](#)

[Palliative care\(Mayo Clinic\)](#)

[Radiation therapy\(Mayo Clinic\)](#)

[Thyroidectomy\(Mayo Clinic\)](#)

Show more related information

[Request an Appointment at Mayo Clinic](#)

Clinical trials (Mayo Clinic)

[Explore Mayo Clinic studies](#) testing new treatments, interventions and tests as a means to prevent, detect, treat or manage this disease.

Coping and support (Mayo Clinic)

A diagnosis of thyroid cancer can be frightening. You might feel as if you aren't sure what to do next.

Everyone eventually finds his or her own way of coping with a cancer diagnosis. Until you find what works for you, consider trying to:

- **Find out enough about thyroid cancer to make decisions about your care.** Write down the details of your thyroid cancer, such as the type, stage and treatment options. Ask your doctor where you can go for more information. Good sources of information to get you started including the National Cancer Institute, the American Cancer Society and the American Thyroid Association.
- **Connect with other thyroid cancer survivors.** You might find comfort in talking with people in your same situation. Ask your doctor about support groups in your area. Or connect with thyroid cancer survivors online through the American Cancer Society Cancer Survivors Network or the Thyroid Cancer Survivors' Association.
- **Control what you can about your health.** You can't control whether or not you develop thyroid cancer, but you can take steps to keep your body healthy during and after

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treatment. For instance, eat a healthy diet full of a variety of fruits and vegetables, get enough sleep each night so that you wake feeling rested, and try to incorporate physical activity into most days of your week.

Preparing for your appointment (Mayo Clinic)

If you have signs and symptoms that worry you, start by seeing your family doctor. If your doctor suspects that you may have a thyroid problem, you may be referred to a doctor who specializes in diseases of the endocrine system (endocrinologist).

Because appointments can be brief, and because there's often a lot of information to go over, it's a good idea to be well prepared. Here's some information to help you get ready, and what to expect from your doctor.

What you can do

- **Be aware of any pre-appointment restrictions.** At the time you make the appointment, be sure to ask if there's anything you need to do in advance, such as restrict your diet.
- **Write down any symptoms you're experiencing,** including any that may seem unrelated to the reason for which you scheduled the appointment.
- **Write down key personal information,** including any major stresses or recent life changes.
- **Make a list of all medications,** vitamins or supplements that you're taking. Don't forget to include any over-the-counter medications.
- **Take a family member or friend along.** Sometimes it can be difficult to recall all the information provided during an appointment. Someone who accompanies you may remember something that you missed or forgot.
- **Write down questions to ask** your doctor.

Your time with your doctor is limited, so preparing a list of questions can help you make the most of your time together. List your questions from most important to least important in case time runs out. For thyroid cancer, some basic questions to ask your doctor include:

- What type of thyroid cancer do I have?
- What stage is my thyroid cancer?
- What treatments do you recommend?
- What are the benefits and risks of each treatment option?
- I have other health problems. How can I best manage them together?
- Will I be able to work and do my usual activities during thyroid cancer treatment?
- Should I seek a second opinion?
- Should I see a doctor who specializes in thyroid diseases?
- How quickly do I need to make a decision about thyroid cancer treatment? Can I take some time to consider my options?

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- Are there any brochures or other printed material that I can take with me? What websites do you recommend?
- Am I able to access my medical records through an online patient portal?

[Hypothyroidism \(underactive thyroid\)\(Mayo Clinic\)](#)

- [Symptoms & causes](#)
- [Diagnosis & treatment](#)
- [Doctors & departments](#)

[Print](#)

Overview

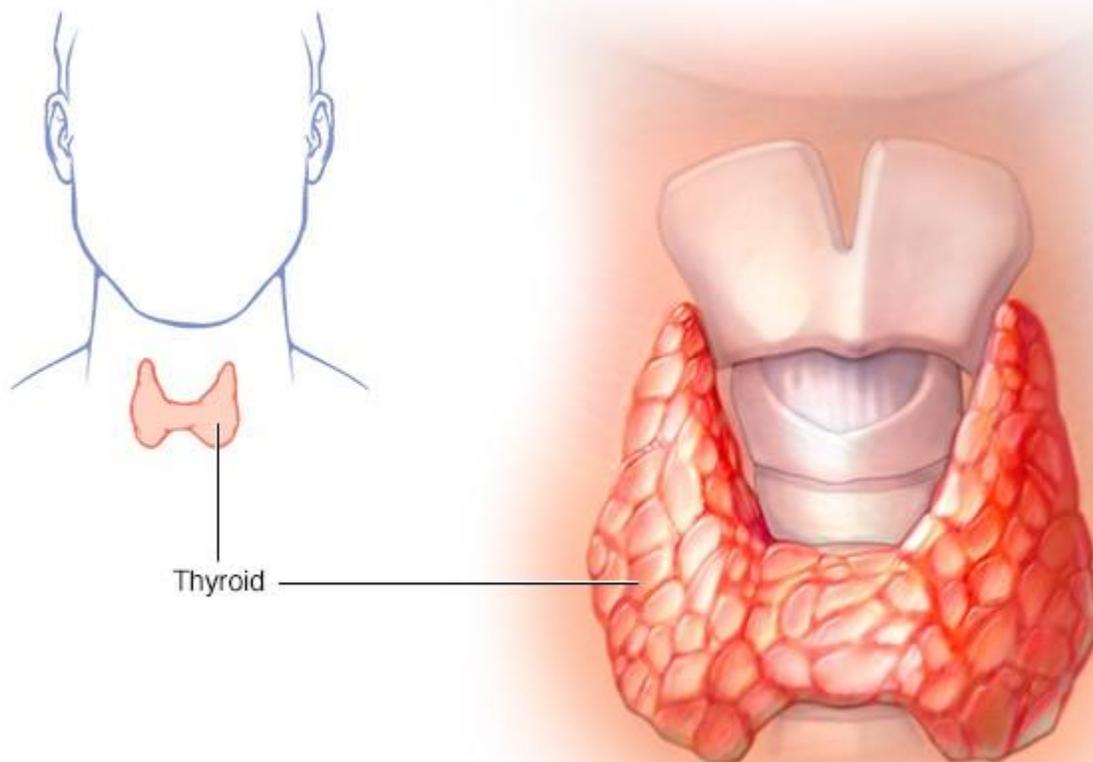
Hypothyroidism (underactive thyroid) is a condition in which your thyroid gland doesn't produce enough of certain crucial hormones.

Hypothyroidism may not cause noticeable symptoms in the early stages. Over time, untreated hypothyroidism can cause a number of health problems, such as obesity, joint pain, infertility and heart disease.

Accurate thyroid function tests are available to diagnose hypothyroidism. Treatment with synthetic thyroid hormone is usually simple, safe and effective once you and your doctor find the right dose for you.

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Symptoms



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Thyroid gland

The signs and symptoms of hypothyroidism vary, depending on the severity of the hormone deficiency. Problems tend to develop slowly, often over a number of years.

At first, you may barely notice the symptoms of hypothyroidism, such as fatigue and weight gain. Or you may simply attribute them to getting older. But as your metabolism continues to slow, you may develop more-obvious problems.

Hypothyroidism signs and symptoms may include:

- Fatigue

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- Increased sensitivity to cold
- Constipation
- Dry skin
- Weight gain
- Puffy face
- Hoarseness
- Muscle weakness
- Elevated blood cholesterol level
- Muscle aches, tenderness and stiffness
- Pain, stiffness or swelling in your joints
- Heavier than normal or irregular menstrual periods
- Thinning hair
- Slowed heart rate
- Depression
- Impaired memory
- Enlarged thyroid gland (goiter)

Hypothyroidism in infants

Although hypothyroidism most often affects middle-aged and older women, anyone can develop the condition, including infants. Initially, babies born without a thyroid gland or with a gland that doesn't work properly may have few signs and symptoms. When newborns do have problems with hypothyroidism, the problems may include:

- Yellowing of the skin and whites of the eyes (jaundice). In most cases, this occurs when a baby's liver can't metabolize a substance called bilirubin, which normally forms when the body recycles old or damaged red blood cells.

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- A large, protruding tongue.
- Difficulty breathing.
- Hoarse crying.
- An umbilical hernia.

As the disease progresses, infants are likely to have trouble feeding and may fail to grow and develop normally. They may also have:

- Constipation
- Poor muscle tone
- Excessive sleepiness

When hypothyroidism in infants isn't treated, even mild cases can lead to severe physical and mental retardation.

Hypothyroidism in children and teens

In general, children and teens who develop hypothyroidism have the same signs and symptoms as adults do, but they may also experience:

- Poor growth, resulting in short stature
- Delayed development of permanent teeth
- Delayed puberty
- Poor mental development

When to see a doctor

See your doctor if you're feeling tired for no reason or have any of the other signs or symptoms of hypothyroidism, such as dry skin, a pale, puffy face, constipation or a hoarse voice.

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If you're receiving hormone therapy for hypothyroidism, schedule follow-up visits as often as your doctor recommends. Initially, it's important to make sure you're receiving the correct dose of medicine. And over time, the dose you need may change.

More Information

- [Hypothyroidism and joint pain?](#)

[Request an Appointment at Mayo Clinic](#)

Causes

When your thyroid doesn't produce enough hormones, the balance of chemical reactions in your body can be upset. There can be a number of causes, including autoimmune disease, hyperthyroidism treatments, radiation therapy, thyroid surgery and certain medications.

Your thyroid is a small, butterfly-shaped gland situated at the base of the front of your neck, just below your Adam's apple. Hormones produced by the thyroid gland — triiodothyronine (T3) and thyroxine (T4) — have an enormous impact on your health, affecting all aspects of your metabolism. These hormones also influence the control of vital functions, such as body temperature and heart rate.

Hypothyroidism results when the thyroid gland fails to produce enough hormones. Hypothyroidism may be due to a number of factors, including:

- **Autoimmune disease.** The most common cause of hypothyroidism is an autoimmune disorder known as Hashimoto's thyroiditis. Autoimmune disorders occur when your immune system produces antibodies that attack your own tissues. Sometimes this process involves your thyroid gland.

Scientists aren't sure why this happens, but it's likely a combination of factors, such as your genes and an environmental trigger. However it happens, these antibodies affect the thyroid's ability to produce hormones.

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- **Over-response to hyperthyroidism treatment.** People who produce too much thyroid hormone (hyperthyroidism) are often treated with radioactive iodine or anti-thyroid medications. The goal of these treatments is to get thyroid function back to normal. But sometimes, correcting hyperthyroidism can end up lowering thyroid hormone production too much, resulting in permanent hypothyroidism.
- **Thyroid surgery.** Removing all or a large portion of your thyroid gland can diminish or halt hormone production. In that case, you'll need to take thyroid hormone for life.
- **Radiation therapy.** Radiation used to treat cancers of the head and neck can affect your thyroid gland and may lead to hypothyroidism.
- **Medications.** A number of medications can contribute to hypothyroidism. One such medication is lithium, which is used to treat certain psychiatric disorders. If you're taking medication, ask your doctor about its effect on your thyroid gland.

Less often, hypothyroidism may result from one of the following:

- **Congenital disease.** Some babies are born with a defective thyroid gland or no thyroid gland. In most cases, the thyroid gland didn't develop normally for unknown reasons, but some children have an inherited form of the disorder. Often, infants with congenital hypothyroidism appear normal at birth. That's one reason why most states now require newborn thyroid screening.
- **Pituitary disorder.** A relatively rare cause of hypothyroidism is the failure of the pituitary gland to produce enough thyroid-stimulating hormone (TSH) — usually because of a benign tumor of the pituitary gland.
- **Pregnancy.** Some women develop hypothyroidism during or after pregnancy (postpartum hypothyroidism), often because they produce antibodies to their own thyroid gland. Left untreated, hypothyroidism increases the risk of miscarriage, premature delivery and preeclampsia — a condition that causes a significant rise in a woman's blood pressure during the last three months of pregnancy. It can also seriously affect the developing fetus.
- **Iodine deficiency.** The trace mineral iodine — found primarily in seafood, seaweed, plants grown in iodine-rich soil and iodized salt — is essential for the production of thyroid hormones. Too little iodine can lead to hypothyroidism, and

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too much iodine can worsen hypothyroidism in people who already have the condition. In some parts of the world, iodine deficiency is common, but the addition of iodine to table salt has virtually eliminated this problem in the United States.

Risk factors

Although anyone can develop hypothyroidism, you're at an increased risk if you:

- Are a woman
- Are older than 60
- Have a family history of thyroid disease
- Have an autoimmune disease, such as type 1 diabetes or celiac disease
- Have been treated with radioactive iodine or anti-thyroid medications
- Received radiation to your neck or upper chest
- Have had thyroid surgery (partial thyroidectomy)
- Have been pregnant or delivered a baby within the past six months

Complications

Untreated hypothyroidism can lead to a number of health problems:

- **Goiter.** Constant stimulation of your thyroid to release more hormones may cause the gland to become larger — a condition known as a goiter. Although generally not uncomfortable, a large goiter can affect your appearance and may interfere with swallowing or breathing.
- **Heart problems.** Hypothyroidism may also be associated with an increased risk of heart disease and heart failure, primarily because high levels of low-density lipoprotein (LDL) cholesterol — the "bad" cholesterol — can occur in people with an underactive thyroid.

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- **Mental health issues.** Depression may occur early in hypothyroidism and may become more severe over time. Hypothyroidism can also cause slowed mental functioning.
- **Peripheral neuropathy.** Long-term uncontrolled hypothyroidism can cause damage to your peripheral nerves. These are the nerves that carry information from your brain and spinal cord to the rest of your body — for example, your arms and legs. Peripheral neuropathy may cause pain, numbness and tingling in affected areas.
- **Myxedema.** This rare, life-threatening condition is the result of long-term, undiagnosed hypothyroidism. Its signs and symptoms include intense cold intolerance and drowsiness followed by profound lethargy and unconsciousness.

A myxedema coma may be triggered by sedatives, infection or other stress on your body. If you have signs or symptoms of myxedema, you need immediate emergency medical treatment.

- **Infertility.** Low levels of thyroid hormone can interfere with ovulation, which impairs fertility. In addition, some of the causes of hypothyroidism — such as autoimmune disorder — can also impair fertility.
- **Birth defects.** Babies born to women with untreated thyroid disease may have a higher risk of birth defects compared to babies born to healthy mothers. These children are also more prone to serious intellectual and developmental problems.

Infants with untreated hypothyroidism present at birth are at risk of serious problems with both physical and mental development. But if this condition is diagnosed within the first few months of life, the chances of normal development are excellent.

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