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#Reference From NCCN Guidelines

# Contents

# 1
# Thyroid cancer basics



Several different types of cancer can start in the thyroid gland. Most are curable with the right treatment. Surgery is recommended for most thyroid cancers.

## The thyroid

The thyroid is a butterfly-shaped gland in the front of the neck, below the Adam's apple. It has two lobes, a right and a left. A thin piece of tissue called the isthmus connects the two lobes.

The thyroid makes substances called hormones that are essential for the body to function properly. These hormones circulate in the blood and help regulate body temperature, blood pressure, heart rate, weight, and metabolism (how fast food becomes fuel for your body).

The two main hormones made by the thyroid are thyroxine (T4) and triiodothyronine (T3). Together, these are often referred to simply as "thyroid hormone." The thyroid uses a mineral from your diet called iodine to produce these hormones. Certain foods and iodized salt contain iodine.

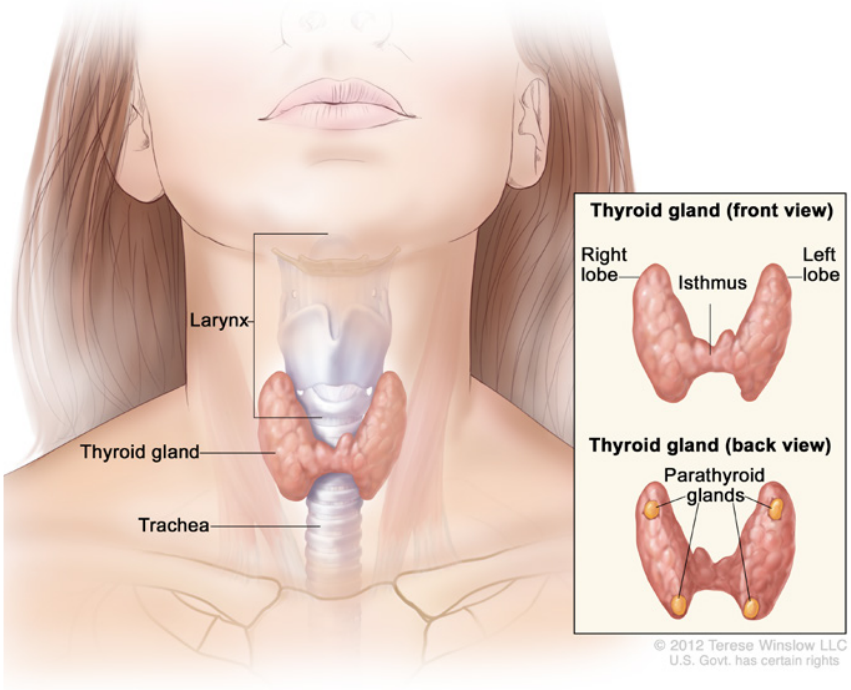
There are four pea-sized glands on the back of the thyroid gland. These are known as the parathyroid glands. They control the amount of calcium in your bloodstream.

### Thyroid nodules

Thyroid nodules are small, often round areas of abnormal growth within the thyroid gland. Most are not cancerous. Very small nodules usually cannot be seen or felt, but

### Thyroid gland

**The thyroid is a butterfly-shaped gland in the lower front part of the neck. It makes hormones that control blood pressure, metabolism, and other body functions.**



a large nodule may be found during a hand examination of the neck.

Most thyroid nodules do not cause symptoms. They are often found by imaging tests done for a different reason. Possible symptoms of larger nodules include:

- A visible lump in the neck
- Neck pain
- Voice changes
- Trouble breathing
- Problems swallowing

## Who is at risk?

Females are 3 times more likely than males to be diagnosed with a thyroid cancer. Compared to other cancers, thyroid cancer is often diagnosed earlier in adulthood. It is the most common cancer in adults ages 18 to 33. See *NCCN Guidelines for Patients: Adolescents and Young Adults with Cancer* at NCCN.org/patientguidelines.

Anything that increases the chances of getting a disease is called a risk factor. The most well-known risk factors for thyroid cancer are radiation exposure and a family history of thyroid cancer.

### Radiation exposure

Anyone who has had radiation treatment to the head or neck in the past (to treat a childhood cancer, for example) is at increased risk of thyroid cancer. Contact with large amounts of radiation in the environment as a result of a catastrophic event also increases the risk of developing a thyroid cancer.

### Family history

Most thyroid cancers are sporadic, meaning there is no clear risk factor. In some cases, however, thyroid cancer can be hereditary. A personal or family history of thyroid cancer or a related syndrome may increase the risk of thyroid cancer. Syndromes related to thyroid cancer include familial adenomatous polyposis (FAP), Carney complex, Cowden syndrome, and multiple endocrine neoplasia (MEN).

An increased risk for certain cancers can be passed from parent to child through genes. A process called mutation is when a change occurs in the genetic code. Mutations can be passed on from a parent and be present before you are born (inherited), or they can be caused by genetic damage that occurs later in life (acquired).

People with inherited genetic mutations have a higher risk for certain cancers, but will not always develop the cancer. Only a small number of thyroid cancers are a result of inherited mutations.

### Prognosis

Prognosis refers to the expected course or outcome of a disease. This includes how likely the cancer is to be cured and how likely it is to return. Most thyroid cancers have an excellent prognosis, especially those found before age 55.

## Testing

Although most nodules are not cancerous, testing is recommended if a nodule is found. The first tests usually ordered after a thyroid nodule is discovered or suspected are:

- Thyroid-stimulating hormone (TSH) blood test
- Ultrasound of the thyroid and neck

Your doctor uses the results of these tests to decide whether a biopsy is needed.

### TSH test

TSH is a hormone made by the pituitary gland, located near the base of the brain. TSH controls the hormones made by the thyroid. TSH is checked to make sure the nodule isn't producing thyroid hormone. Nodules that produce thyroid hormone are rarely cancer.

A TSH blood test cannot diagnose thyroid cancer.

A high TSH level usually means that the thyroid hormone levels are low. Likewise, a low TSH level usually means that the thyroid hormone levels are high. If the TSH is low (which may suggest overactive thyroid), your doctor may order a radioiodine (RAI) uptake test.

### Ultrasound

Ultrasound is the most common imaging technique used to look for thyroid cancer. It uses sound waves to form images showing the size, shape, and location of a thyroid nodule.

An ultrasound of the thyroid and neck is brief and painless. It is usually done lying down. A hand-held device called an ultrasound probe is used. After a gel is applied to the skin, the

### Ultrasound

**An ultrasound of the thyroid and neck is one of the first tests ordered if a thyroid nodule is known or suspected.**

probe is moved back and forth over the thyroid area.

Although ultrasound is used most often, the following imaging tests may be used in certain situations:

- Computed tomography (CT)
- Positron emission tomography (PET)
- Magnetic resonance imaging (MRI)

## Biopsy

A biopsy removes samples of fluid or tissue from the body to be tested. Your doctor will consider the nodule size and other features as seen on the ultrasound exam to determine if a biopsy is needed. Some nodules do not need to be biopsied and are monitored with ultrasound.

If a biopsy is needed, the type used most often for thyroid cancer is called fine-needle aspiration (FNA). FNA is often referred to simply as a "needle biopsy." FNA uses a thin needle to take small samples of suspicious thyroid nodules. Ultrasound is usually done at the same time to help pinpoint the suspicious areas.

### Pathology review

The biopsy samples are sent to a pathologist. Pathologists are physicians with expertise in examining tissues and cells to diagnose disease. By examining the sample under a microscope, the pathologist is able to determine whether the nodule is cancerous, and if so, the cancer type.

In certain types of lesions, such as follicular and Hürthle cell tumors, FNA can identify the nature of the cells, but cannot determine if the nodule is benign or malignant. In these lesions, surgery is needed to make a final diagnosis. In recent years, molecular tests have been developed to help decide if surgery is necessary when the biopsy results cannot determine whether the nodule is cancerous or benign.

Papillary carcinoma is the most common type of thyroid cancer, followed by follicular carcinoma. Papillary, follicular, and Hürthle cell carcinomas are known as the "differentiated" thyroid cancers. Differentiated cancers usually grow and spread slowly. Treatment of these types is addressed in the following chapter.

Medullary thyroid cancer is the third most common type, after papillary and follicular. This type can be inherited, meaning it can run in families. Medullary thyroid cancer is the focus of Part 3.

Anaplastic thyroid cancer is the most aggressive type of thyroid cancer. It is rare and most often affects older adults. This type is the focus of Part 4.

The type and other features of benign (not cancerous) and malignant (cancerous) lesions are recorded in a pathology report. You are encouraged to request a copy of the report for your reference and to have for your records. It is used by your treatment team to plan further testing and treatment.

# Treatments

Surgery (described next) is the most common treatment for most thyroid cancers. However, active surveillance may be an option for some very-low-risk thyroid cancers. Active surveillance involves closely monitoring the cancer instead of doing surgery right away.

## Surgery

Surgery is the most effective treatment for thyroid cancer. Surgery may involve removing the entire thyroid gland, or just the half with known cancer.

### Lobectomy

A lobectomy removes the lobe of the thyroid that contains the cancerous nodule (the tumor). The tissue connecting the two lobes (the isthmus) is also removed. While under general anesthesia, a small incision is made in the front of the neck to remove the cancerous lobe. Lobectomy may be an option for some small and low-risk differentiated thyroid cancers.

### Total thyroidectomy

A total thyroidectomy removes the entire thyroid gland. While under general anesthesia, a small incision is made in the front of the neck to remove the gland. Lymph nodes near the thyroid are also removed if they are known or suspected to have cancer. This is called a neck dissection.

### Side effects

With any surgery, there is risk of infection, bleeding, or pain. Your treatment team can give you a complete list of side effects. Most people stay in the hospital overnight after surgery. After being discharged, it is important to follow the instructions for at-home care.

### Treatment team

Treating thyroid cancer takes a team of experts. Your treatment team may include an endocrinologist, radiologist, nuclear medicine specialist, surgeon, radiation oncologist, and medical oncologist.

Your treatment team will work together to decide on the treatment plan that is best for you. A treatment plan is a written course of action that covers every phase of the treatment process.

Contact your care team about any new or worsening side effects.

Possible long-term side effects of removing the thyroid include:

- Low levels of calcium in the blood (hypoparathyroidism)
- Damage to the nerves that control your voice and swallowing

### Thyroid hormone replacement therapy

After a total thyroidectomy, medicine is used to replace the hormones no longer being supplied by the thyroid. This is called thyroid hormone replacement therapy. It is needed lifelong in all people after total thyroidectomy. After a lobectomy, about 1 in 5 people need thyroid hormone replacement.

Levothyroxine (eg, Levoxyl; Synthroid) is the most commonly used thyroid hormone replacement therapy. The goal for most patients is to keep the level of thyroid-stimulating hormone (TSH) in the low normal range. For higher risk thyroid cancers, or if there are signs of recurrence, the TSH level is kept lower than the normal range ("suppressed"). This helps prevent thyroid cancer cells from growing or returning, and is an important part of cancer therapy for most differentiated thyroid cancers.

Levothyroxine is taken as a pill once a day. Determining the right dose for you can take some trial and error. Common side effects if the dose of levothyroxine isn't optimal include:

- Anxiety
- Trouble sleeping
- Racing heart
- Sweating

Blood tests are used to check the TSH on a regular basis during thyroid replacement therapy. Your doctor can find the right dose of thyroid hormone for you by checking the TSH level and adjusting the dose as needed.

Too much levothyroxine can cause health problems, including:

- Weakened bone strength
- Heart rhythm problems
- Having too much thyroid hormone (thyrotoxicosis)

### Calcium and vitamin D

Your care team may recommend taking calcium and vitamin D supplements to help strengthen bones.

Screening is not recommended for thyroid cancer. Screening is testing for a disease in someone without symptoms.

## Radioactive iodine (RAI) therapy

RAI therapy uses a form of radioactive iodine (iodine-131) to selectively kill thyroid cancer cells that take up ("eat") iodine. The goal is to target only the thyroid cells in the neck (both cancer cells and any remaining normal thyroid cells) and elsewhere in the body while sparing healthy cells and tissues. RAI therapy may be used in the following situations:

- To reduce the risk of recurrence in higher-risk thyroid cancers
- To treat metastatic thyroid cancer
- Shortly after thyroidectomy for some lower-risk risk cancers using lower-dose iodine-131 (also known as remnant ablation)

RAI therapy is used after total thyroidectomy for differentiated thyroid cancers that take up iodine. It is generally only recommended for those at higher risk of cancer recurrence. Most papillary and follicular thyroid cancers take up iodine. Hürthle cell thyroid cancer may take up iodine less often. RAI is not effective against medullary or anaplastic thyroid cancer.

### How is it given?

RAI therapy comes in liquid or pill form and is taken by mouth. You may be asked to eat a diet low in iodine for 1 to 2 weeks before starting this treatment. Hormone injections may be given to increase the TSH level several days before RAI is started. Or, thyroid hormone replacement may be stopped for several weeks before RAI therapy. Your doctor will provide instructions on how to prepare for this treatment.

Possible side effects of RAI therapy include:

- Neck pain or swelling in glands near the jaw
- Nausea and vomiting
- Dry mouth or eyes
- Watery eyes
- Change in taste or smell

If you have a CT scan with contrast, it can delay the start of treatment with RAI therapy. Your doctor will consider this when planning your care. In some cases a CT may be necessary to see more of the neck or chest area to check for disease.

The dose of RAI therapy is often adjusted for children with thyroid cancer and people on dialysis for kidney disease. If any cancer can be removed by surgery, this will be considered before starting RAI therapy.

### Safety measures

The radiation itself will exit your body through urine and other body fluids. This means that your body will give off small amounts of radiation after treatment. For a short period, you will need to take safety measures around other people, especially children or pregnant people. Ask your care team for a complete list of instructions on your care before, during, and after RAI therapy.

### Whole-body RAI scan

After RAI therapy, a whole-body radioiodine scan is performed to look for remaining thyroid tissue and "hidden" areas of thyroid cancer in the body. At some treatment centers, a whole-body scan is also done before RAI therapy.

This imaging can be done using small doses of iodine-131 or a similar form of radioactive iodine called iodine-123. A whole-body RAI scan is often done when thyroid hormone replacement therapy is paused. If stopping thyroid hormone is not recommended for you, there is another option for doing the scan. A medication known as thyrotropin alfa (Thyrogen) can be used. Thyrogen activates iodine uptake so that hormone replacement with levothyroxine can be continued during imaging and therapy.

## Radiation therapy

Radiation therapy uses high-energy X-rays or particles to destroy small areas of cancer. In the treatment of thyroid cancer, radiation is given using a large machine outside the body. This is called external beam radiation therapy (EBRT).

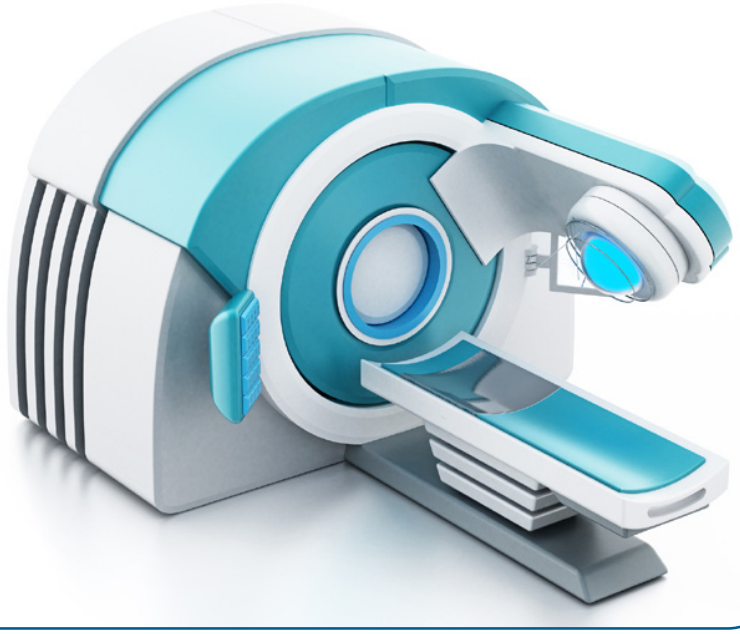
The use of radiation therapy differs by thyroid cancer type. It is rarely used for papillary and follicular cancers. Anaplastic thyroid cancer, in contrast, is almost always treated with radiation therapy.

Radiation therapy may be used for thyroid cancer that cannot be removed with surgery and does not respond to RAI therapy. Radiation therapy can also relieve symptoms caused by cancer. For thyroid cancer that has spread, this could include difficulty or pain swallowing, loss of your voice, or pain or stiffness in your neck. Additionally, radiation may also be used in instances where the cancer has spread to another organ, such as the lungs or brain, to stop the cancer from growing in that specific area.

You will first have a planning session called a simulation. You will be placed in the treatment position and a CT scan or other type of scan will be done. The CT scan images will be used to make a radiation plan specifically tailored to your body and cancer. The plan will specify the

### Radiation therapy

**Radiation therapy uses high-energy radiation from x-rays, gamma rays, protons, and other sources to kill cancer cells and shrink tumors. It is also used to treat pain caused by cancers.**



recommended radiation dose for you, as well as the number of sessions you will need.

During radiation treatment, you will lie on a table in the same position as during simulation. Devices may be used to keep you from moving so that the radiation targets the tumor, but in most cases the machine and room will have an open design in which a machine arm rotates around you. This is unlike an MRI, which can be closed-in. A technician operates the radiation machine from a nearby room, but is able to see, hear, and speak with you at all times. You will not feel anything while the radiation is being delivered, similar to having a CT scan or an X-ray performed. One treatment session can take between 30 to 60 minutes. It is common to have 5 sessions per week.

Although the radiation targets areas of cancer directly, nearby normal cells can sometimes also be harmed. Damage to normal cells can cause side effects. Common side effects of radiation to the neck area include:

- Skin rash or redness
- Problems swallowing
- Dry mouth
- Thick saliva
- Taste changes
- Tiredness (fatigue)
- Change in taste

While most side effects of radiation therapy start during treatment and stop shortly after it is over, some can occur years later. If your doctor recommends external radiation, they will discuss what to expect from treatment, including possible short- and long-term effects.

## Systemic therapy

Systemic therapy is treatment with substances that travel in the bloodstream, reaching and affecting cells throughout the body. Chemotherapy, targeted therapy, and immunotherapy are types of systemic therapy.

Chemotherapy does not work well against most thyroid cancers. It may be used to treat thyroid cancer that is not responding to other treatment, or that has spread to distant areas of the body. It is most often used for the least common and most aggressive type—anaplastic thyroid cancer. Most chemotherapy medicines are put directly into the bloodstream through a vein.

Targeted therapies can target and attack specific types of cancer cells. Targeted therapy is generally only used for thyroid cancers that:

- Cannot be treated with surgery or RAI therapy
- Have returned after treatment
- Have spread to areas far from the neck (metastasized) and are continuing to grow

The targeted therapies currently used for thyroid cancer are called kinase inhibitors. Most are capsules that you swallow. The recommended kinase inhibitors differ somewhat by thyroid cancer type. See the chapters that follow for the targeted therapies used for a specific type of thyroid cancer.

### Biomarker testing

Biomarkers are specific features of cancer cells. Biomarkers can include proteins made in response to the cancer and/or reflect changes (mutations) in the DNA of the cancer cells. Biomarker testing is used to learn whether

the cancer has any targetable changes to help guide your treatment. If it does, targeted therapy or immunotherapy may be a treatment option if needed. The results of biomarker testing can also be used to determine whether you meet the criteria for joining certain clinical trials.

Testing for biomarkers involves analyzing a piece of tumor tissue in a laboratory or testing a sample of blood. Other names for biomarker testing include molecular testing, tumor profiling, genomic testing, tumor gene testing, next-generation sequencing, and mutation testing.

The anaplastic lymphoma kinase (*ALK*) gene makes a protein involved in cell growth. Mutations in the *ALK* gene may increase the growth of cancer cells.

In a tumor with a neurotrophic receptor kinase (*NTRK*) gene fusion, a piece of the *NTRK* gene and a piece of another gene fuse, or join. This activates the *NTRK* gene in a way that causes uncontrolled cell growth.

Mutations in the *RET* gene are associated with medullary thyroid cancer.

The biomarkers described next are less common in thyroid cancer. Your doctor may test for these biomarkers if the cancer returns and/or metastasizes after initial treatment.

In normal cells, a process called mismatch repair (MMR) fixes damaged DNA. If a cell's MMR system is not working properly, errors build up and cause the DNA to become unstable. This is known as microsatellite instability (MSI). There are two kinds of laboratory tests for this biomarker. Depending on the method used, an abnormal result is called either microsatellite instability high (MSI-H) or mismatch repair deficient (dMMR).

The total number of mutations (changes) found in the DNA of cancer cells is known as the tumor mutational burden (TMB). If the number of mutations is higher than a specific threshold, the tumor is referred to as TMB-high (TMB-H).

### Systemic therapy side effects

Side effects of systemic therapy can include:

- Tiredness (fatigue)
- Nausea and vomiting
- Diarrhea
- Constipation
- Hair loss
- Mouth sores
- Loss of appetite
- Low blood cell counts

Side effects seen more often with targeted therapy include body aches, rash, high blood pressure, and abnormal bleeding. Some targeted therapies have serious side effects that can affect your heart, skin, and digestive system.

Not all side effects are listed in this guide. If systemic therapy is planned, ask your treatment team for a complete list of potential side effects. While most side effects start when treatment starts and stop when treatment is over, some can occur years later.

Long-term side effects of chemotherapy can include other cancers, heart disease, and not being able to have children (infertility).

# Clinical trials

A clinical trial is a type of medical research study. After being developed and tested in a laboratory, potential new ways of fighting cancer need to be studied in people. If found to be safe and effective in a clinical trial, a drug, device, or treatment approach may be approved by the U.S. Food and Drug Administration (FDA).

Everyone with cancer should carefully consider all of the treatment options available for their cancer type, including standard treatments and clinical trials. Talk to your doctor about whether a clinical trial may make sense for you.

## Phases

Most cancer clinical trials focus on treatment. Treatment trials are done in phases.

- **Phase I** trials study the safety and side effects of an investigational drug or treatment approach. They also look for early signs that the drug or approach is helpful.
- **Phase II** trials study how well the drug or approach works against a specific type of cancer.
- **Phase III** trials test the drug or approach against a standard treatment. If the results are good, it may be approved by the FDA.
- **Phase IV** trials study the long-term safety and benefit of an FDA-approved treatment.

## Who can enroll?

Every clinical trial has rules for joining, called eligibility criteria. The rules may be about age,

## Finding a clinical trial

**In the United States**

**NCCN Cancer Centers**
NCCN.org/cancercenters

**The National Cancer Institute (NCI)**
cancer.gov/about-cancer/treatment/clinical-trials/search

**Worldwide**

**The U.S. National Library of Medicine (NLM)**
clinicaltrials.gov/

**Need help finding a clinical trial?**

**NCI's Cancer Information Service (CIS)**
1.800.4.CANCER (1.800.422.6237)
cancer.gov/contact

cancer type and stage, treatment history, or general health. These requirements ensure that participants are alike in specific ways and that the trial is as safe as possible for the participants.

## Informed consent

Clinical trials are managed by a group of experts called a research team. The research team will review the study with you in detail, including its purpose and the risks and benefits of joining. All of this information is also provided in an informed consent form. Read the form carefully and ask questions before signing it. Take time to discuss with family, friends, or others you trust. Keep in mind that you can leave and seek treatment outside of the clinical trial at any time.

## Start the conversation

Don't wait for your doctor to bring up clinical trials. Start the conversation and learn about all of your treatment options. If you find a study that you may be eligible for, ask your treatment team if you meet the requirements. Try not to be discouraged if you cannot join. New clinical trials are always becoming available.

## Frequently asked questions

There are many myths and misconceptions surrounding clinical trials. The possible benefits and risks are not well understood by many with cancer.

### Will I get a placebo?

Placebos (inactive versions of real medicines) are almost never used alone in cancer clinical trials. It is common to receive either a placebo with a standard treatment, or a new drug with a standard treatment. You will be informed, verbally and in writing, if a placebo is part of a clinical trial before you enroll.

### Are clinical trials free?

There is no fee to enroll in a clinical trial. The study sponsor pays for research-related costs, including the study drug. You may, however, have costs indirectly related to the trial, such as the cost of transportation or child care due to extra appointments. During the trial, you will continue to receive standard cancer care. This care is billed to—and often covered by—insurance. You are responsible for copays and any costs for this care that are not covered by your insurance.

## Key points

- The thyroid is a butterfly-shaped gland in the neck. It makes hormones that help regulate metabolism and other body functions.
- Thyroid cancers start as small, often round areas of abnormal growth called nodules.
- Although most nodules are not cancerous, a TSH test and ultrasound are recommended if a thyroid nodule is known or suspected.
- The ultrasound results determine whether fine-needle aspiration (FNA) is needed.
- Biopsy samples are sent to a pathologist. The pathologist determines whether the nodule is cancerous and if so, the cancer type.
- Surgery is the main treatment for thyroid cancer. Active surveillance may be an option for very-low-risk cancers.
- RAI therapy may be used after total thyroidectomy to kill any remaining cancer cells.
- Thyroid hormone replacement therapy with levothyroxine is needed lifelong after total thyroidectomy. About 1 in 5 people need hormone replacement after a lobectomy.
- External beam radiation therapy (EBRT) is used for more aggressive (anaplastic), recurrent, or metastatic cancers that cannot be removed surgically.
- Targeted therapy may be an option for thyroid cancers that do not respond to other treatments, or that have metastasized and are continuing to grow.
- Chemotherapy is used most often for anaplastic thyroid cancer. It is rarely used to treat other types of thyroid cancer.
- Clinical trials help doctors learn how to prevent, diagnose, and treat cancer and other diseases.
- Your treatment team may include an endocrinologist, radiologist, nuclear medicine doctor, surgeon, radiation oncologist, and medical oncologist.

# 2
# Differentiated thyroid cancers (papillary, follicular, and Hürthle cell)



Papillary, follicular, and Hürthle cell carcinoma are known as differentiated thyroid cancers. These cancers usually grow slowly and have good treatment outcomes.

Differentiated thyroid cancers are treated with surgery to remove all or part of the thyroid. For many years, total thyroidectomy was the standard treatment for all thyroid cancers. Today, it remains a treatment option for everyone with thyroid cancer. However, newer research shows that lobectomy may be just as effective for treating small, low-risk cancers that have not grown or spread beyond the thyroid. A potential benefit of lobectomy is that thyroid hormone replacement therapy may not be needed. Or, a lower dose may be needed.

## Papillary thyroid cancer

Papillary thyroid carcinoma (PTC) is the most common of all the thyroid cancers. There are different subtypes of papillary thyroid cancer. The most common is “classic type.” Other subtypes that may grow and spread more quickly include:

- Follicular variant of papillary thyroid cancer
- Tall-cell/columnar cell
- Hobnail
- Diffuse sclerosing

### Testing

If a needle biopsy diagnoses papillary thyroid cancer, more testing is needed to learn the extent of the cancer before surgery. An ultrasound of the thyroid and front and sides of the neck is recommended, if one hasn’t already been done.

Additional testing may include:

- Computed tomography (CT)/magnetic resonance imaging (MRI) with contrast
- Vocal cord exam
- Biopsy of suspicious lymph nodes in the neck

### Is surgery always needed?

Some small papillary tumors (no bigger than a pea) may be safely monitored without surgery. This approach is known as active surveillance. The size of the cancer is monitored using ultrasound.

Active surveillance may be an option if:

- The tumor is no larger than 1 centimeter, and
- There are no nearby lymph nodes suspicious for cancer, and
- The tumor is not in a high-risk location (eg, at the back of the thyroid, butting up against the trachea)

## Thyroidectomy or lobectomy?

If surgery is needed, either a total thyroidectomy or lobectomy is performed. Some papillary cancers should always be treated with total thyroidectomy.

A total thyroidectomy is recommended for papillary cancers that have grown or spread beyond the thyroid—whether into the neck, to nearby lymph nodes, or to distant areas.

Tumors larger than 4 cm (about the size of a walnut) and high-risk types of papillary cancer should also be treated with total thyroidectomy. Lymph nodes near the thyroid that are known to have cancer are also removed during surgery.

There are other reasons your doctor may recommend a total thyroidectomy. Factors such as whether the neck area was ever treated with radiation therapy will be considered.

If the cancer is small and noninvasive, lobectomy may be a treatment option in addition to thyroidectomy. Treatment with lobectomy is preferred if:

- You've never had radiation therapy, and
- The cancer has not spread at all beyond the thyroid, and
- The tumor is 1 to 4 centimeters in size.

The extent of the cancer cannot be fully known until the surgeon sees the thyroid, tumor, and surrounding areas first-hand, as well as the results of the pathologic examination of the removed tissues. If the cancer is larger or more invasive than expected during a lobectomy, the decision is usually made during surgery to remove the entire thyroid.

## After total thyroidectomy

If the results of surgery are very good, radioactive iodine (RAI) therapy is sometimes used to kill cancer cells left in the body. See page 25 for more information on RAI therapy and next steps of care.

If a concerning amount of cancer remains after surgery, treatment options may include:

- Another surgery
- RAI therapy
- Radiation therapy
- Systemic therapy
- Monitoring

After treatment with one or more of the above, thyroid hormone replacement therapy with levothyroxine is started. Hormone replacement therapy keeps the TSH level low or normal.

*See page 26 for information on monitoring and follow-up care.*

## After lobectomy

After a lobectomy, everything that was removed or sampled (biopsied) during surgery is examined and tested. If examination of the tumor, other tissue, or lymph nodes by a pathologist finds certain concerning or high-risk features, another surgery to remove the rest of the thyroid is recommended.

If the results of surgery and pathologic examination are very good and no high-risk features are found, more surgery is not

usually needed. Your doctor may recommend thyroid hormone replacement therapy with levothyroxine to keep the TSH level low or normal. This is on a case-by-case basis. Because the thyroid continues to make hormones after a lobectomy, hormone replacement therapy is not always needed.

### NIFTP

Pathologic examination after surgery may find that the tumor is a noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP). A NIFTP is a low-risk, noninvasive thyroid tumor.

NIFTP was previously known as the "encapsulated follicular variant" of papillary thyroid cancer. No further treatment is needed after an NIFTP is surgically removed.

*See page 26 for information on monitoring and follow-up care.*

**Let us know what you think!**

Please take a moment to complete an online survey about the NCCN Guidelines for Patients.

NCCN.org/patients/response

# Follicular and Hürthle cell

After papillary, follicular thyroid carcinoma (FTC) is the next most common type of thyroid cancer. Hürthle cell carcinoma (HCC) is uncommon and more aggressive than the other differentiated thyroid cancers. Compared to other types, spread to lymph nodes by the time of diagnosis is more common with HCC. Follicular and Hürthle cell thyroid cancers are known for invading blood vessels in and around the thyroid.

Unlike papillary thyroid cancer, follicular and Hürthle cell cancers cannot be diagnosed with a needle biopsy alone. FNA can only suggest these types. In order to be diagnosed as follicular or Hürthle cell, the thyroid tumor must have grown into blood vessels (eg, veins or arteries) in and around the thyroid, or into the protective outer layer of the thyroid (the capsule). This can be learned by pathologic examination of the removed thyroid, or in some cases with genetic testing of the biopsy sample.

## Total thyroidectomy or lobectomy?

A total thyroidectomy is recommended for a suspected follicular or Hürthle cell tumor that is larger than 4 centimeters or that has grown beyond the thyroid. There are other reasons a total thyroidectomy may be recommended by your treatment team. Any lymph nodes near the thyroid that are known to have cancer will also be removed during a total thyroidectomy.

If the cancer is smaller than 4 centimeters and has not spread at all beyond the thyroid, lobectomy may be a treatment option in addition to thyroidectomy. The extent of the cancer cannot be fully known until the surgeon sees the thyroid, tumor, and surrounding areas first-hand, as well as the results of the pathologic examination of the removed tissues. If the cancer is more invasive than expected during a lobectomy, the decision is usually made during surgery to remove the entire thyroid.

## After total thyroidectomy

After surgery, everything that was removed or sampled (biopsied) is examined by a pathologist. Pathologic examination may find that the tumor is benign (not cancer). In this case, no more cancer treatment is needed. Lifelong thyroid hormone replacement therapy is needed, however.

If pathologic examination confirms follicular or Hürthle cell thyroid cancer, further treatment depends on the results of surgery. If the results of surgery are very good, RAI therapy may be used to kill cancer cells left in the body. RAI therapy is discussed on the next page.

If a concerning amount of cancer remains after surgery, there is more than one possibility.

Options may include:

- Another surgery (preferred, if possible)
- RAI therapy
- Radiation therapy
- Systemic therapy
- Monitoring

After treatment with one or more of the above, hormone replacement therapy with levothyroxine is started. Hormone replacement therapy keeps the TSH level low or normal.

*See page 26 for information on monitoring and follow-up care.*

### After lobectomy

Depending on the extent of cancer observed during surgery and the results of pathologic examination, you may have more surgery to remove the rest of the thyroid. If the cancer is invasive, removing the rest of the thyroid is recommended.

For less invasive or minimally invasive cancer, surgery to remove the rest of the thyroid is one option. An alternative is to take a watch-and-wait approach and monitor the cancer. If this option is planned, you may receive levothyroxine to keep your TSH level low or normal. This is on a case-by-case basis. Because the thyroid continues to make hormones after a lobectomy, hormone replacement therapy is not always needed.

If the nodule removed during lobectomy is benign, monitoring is recommended. In some cases, you may receive levothyroxine to keep your TSH level normal.

*See page 26 for information on monitoring and follow-up care.*

## Radioactive iodine (RAI) therapy

If all or most of the cancer was removed during total thyroidectomy, RAI therapy may be an option to kill thyroid cancer cells left in the body after surgery.

A number of factors are considered when deciding if RAI therapy may be helpful, including:

- The size of the tumor
- The tumor subtype
- Whether the cancer invaded lymph or blood vessels
- Whether the cancer has spread to lymph nodes
- The thyroglobulin (Tg) level after surgery
- Age at diagnosis

RAI therapy is generally recommended if:

- The cancer had spread significantly beyond the thyroid, or
- The original tumor was over 4 centimeters (about the size of a walnut), or
- The cancer had invaded blood vessels (applies to follicular and Hürthle cell), or
- The Tg level 6 to 12 weeks after surgery was high, or
- There were large, or more than 5, lymph nodes with cancer

If RAI therapy is planned, you may first have another surgery to remove as much of the remaining cancer as possible. After RAI, a whole-body RAI scan is done to see how well the treatment worked. Hormone replacement therapy with levothyroxine is started when RAI therapy is over.

*See the next section for information on monitoring and follow-up care after treatment.*

# Monitoring and follow-up care

Follow-up testing and surveillance is somewhat different after lobectomy versus total thyroidectomy.

## After total thyroidectomy

Short-term follow-up after total thyroidectomy involves a physical examination and blood tests. More information on blood tests is provided below. A neck ultrasound is also recommended 6 to 12 months after surgery.

If you had RAI therapy after total thyroidectomy, you may have whole-body RAI imaging to look for cancer after treatment. It may be helpful for high-risk patients, those with metastases that took up iodine, or those with abnormal blood or ultrasound results.

### Blood tests

Blood testing will measure the levels of the following:

- Thyroid-stimulating hormone (TSH)
- Thyroglobulin (Tg)
- Anti-thyroglobulin antibodies (Tg ab)

Thyroglobulin (Tg) is only made by thyroid tissue. If the thyroid is removed, there should not be any Tg in the blood. Therefore, checking the Tg level can serve as a way to monitor for the return of cancer. If the Tg level rises, it could be a sign that further testing should be done to check for cancer recurrence.

A small number of people with thyroid cancer make antibodies in response to thyroglobulin. These “anti-Tg antibodies” in blood can interfere with the Tg level. If the anti-Tg

### Ultrasound

**Neck ultrasound is used to monitor for the return of thyroid cancer. Talk to your care team about how often you need to have ultrasounds.**

antibody level goes down, it may be a sign that treatment is working. If it goes up, further testing should be done to check for cancer recurrence.

### Long-term monitoring

If follow-up test results are normal, it is considered no evidence of disease (NED). In those with NED, longer-term surveillance includes physical examinations, blood tests (TSH, Tg, and Tg ab), and periodic neck ultrasound. Initially, ultrasound is recommended annually. If blood and imaging results continue to be normal, ultrasounds are needed less often, about every 3 to 5 years.

If there is reason to suspect the cancer has returned, you may have additional lab work, additional neck ultrasounds, TSH-stimulated testing (testing while thyroid hormone is stopped), or imaging procedures such as CT or MRI.

## After lobectomy

Short-term follow-up after lobectomy involves a physical examination and TSH blood test. A neck ultrasound is also recommended 6 to 12 months after surgery. Unlike after total thyroidectomy, thyroglobulin testing is not helpful after lobectomy.

If there is no evidence of disease, longer-term surveillance includes physical exams, TSH blood tests, and neck ultrasound. Ultrasound is typically performed annually for several years following lobectomy. If blood and imaging results continue to be normal, ultrasounds are needed less often, about every 3 to 5 years.

## Survivorship

In addition to surveillance testing, a range of other care is important for cancer survivors. See *Part 5: Survivorship* for more information.

# Recurrence

Although the thyroid has been removed, cancer can return to the neck or to areas far from the neck. The return of cancer after treatment is called recurrence.

### Cancer that returns to the neck

If cancer returns to the neck, surgery, RAI therapy, or both may be used to treat it. If the cancer can be removed based on its size and location, surgery is preferred.

In some cases, monitoring the cancer closely instead of treating it may be an option. If the cancer is not getting worse and is not close to any critical structures, a watch-and-wait approach may be appropriate.

If the cancer cannot be removed with surgery, does not take up iodine, and is getting worse (progressing), treatment with radiation therapy, targeted therapy, or both may be an option. Recommended targeted therapies for cancer that cannot be removed with surgery and is progressing are listed in Guide 1.

If the therapies listed in Guide 1 are not available, your treatment team may recommend others not listed here. In this case, joining a clinical trial is strongly encouraged.

**Guide 1**
**Targeted therapy for papillary, follicular, and Hürthle cell cancers**

| | |
|---|---|
| **For worsening and/or symptomatic cancer** | • Lenvatinib (Lenvima) **(preferred)**<br>• Sorafenib (Nexavar)<br>If the cancer worsens after treatment with one or both of the above, cabozantinib (Cabometyx) is recommended |
| ***For NTRK* gene fusion-positive cancers** | • Larotrectinib (Vitrakvi)<br>• Entrectinib (Rozlytrek) |
| **For cancers with *RET* mutations** | • Selpercatinib (Retevmo)<br>• Pralsetinib (Gavreto) |
| **For tumor mutational burden high (TMB-H) cancers** | Pembrolizumab (Keytruda) |

# Metastatic cancer

Thyroid cancer that spreads to areas far from the neck is known as metastatic. The distant areas of cancer are called metastases. Metastases can form anywhere, but occur most commonly in the lungs, liver, muscles, bones, brain, and spinal cord.

If the cancer takes up iodine, RAI therapy is recommended to treat metastatic papillary, follicular, or Hürthle cell thyroid cancers. Local therapies, such as radiation therapy, may also be used to treat areas of cancer directly.

## If RAI therapy is not an option

If the cancer does not take up iodine, options may include targeted therapy and treating metastases directly using local therapies. These and other options are described in more detail next. You will continue to take levothyroxine to keep your TSH level down.

### Targeted therapy

If RAI therapy is not possible, targeted therapy may be an option. However, if the metastases are not growing (or growing very slowly) and not causing symptoms, monitoring the cancer may be a better option.

To learn whether you are eligible for treatment with a targeted therapy or immunotherapy, testing for the following biomarkers is recommended. See page 15 for more information on biomarker testing.

- *ALK, NTRK,* and *RET* gene fusions
- DNA mismatch repair deficiency (dMMR)
- Microsatellite instability (MSI)
- Tumor mutational burden (TMB)

Testing may include other biomarkers not listed here, such as *BRAF* mutations.

Recommended targeted therapies for metastatic cancer that cannot be treated with surgery or RAI are listed in Guide 1.

Other systemic therapies are available and may be recommended if those listed in Guide 1 are not available or appropriate. Joining a clinical trial is strongly encouraged for everyone with metastatic thyroid cancer.

### Local therapies

Small tumors can be treated directly using one or more types of local therapy. If the cancer has only spread to a limited number of sites, or has spread to bone and/or is causing symptoms, it may be possible to remove or destroy the metastases with surgery and/or radiation therapy.

Ablation is another method used to treat small bone tumors. In ethanol ablation, a concentrated alcohol solution is injected into the neck to kill cancer cells. Cryoablation involves applying an extremely cold “wand” directly into the tumor. Radiofrequency ablation uses radiofrequency waves that generate heat to kill cancer cells. Stereotactic body radiotherapy (SBRT) is a special ablative radiation technique that delivers high doses of radiation to precise areas to kill cancer cells.

Your doctor may recommend intravenous bisphosphonate or denosumab. These are bone-strengthening medications that can slow damage caused by bone metastases and help relieve symptoms.

If the cancer has spread to the brain or spinal cord (the central nervous system), options

for treatment may include surgery to remove the metastases. Stereotactic radiosurgery (SRS) is a non-surgical and highly precise type of radiation therapy that can be used to treat small brain or spine tumors. Whole brain radiation therapy (WBRT) is another type of EBRT used to treat cancer in the brain in which radiation is given to the whole brain.

### Clinical trial

Joining a clinical trial is strongly encouraged for everyone with metastatic thyroid cancer that is progressing. Ask your treatment team if there is an open clinical trial you might be eligible for. See page 17 and the last chapter of this book for more information.

### Supportive care

Supportive care plays an essential role in the care of people with metastatic thyroid cancer. In addition to providing relief from symptoms caused by cancer and its treatment, supportive care can provide emotional, spiritual, and social support.

## Key points

- Papillary, follicular, and Hürthle cell are differentiated thyroid cancers.
- Differentiated cancers tend to grow and spread slowly. They usually have good treatment outcomes.
- Total thyroidectomy is an option for all of the differentiated cancers. Lobectomy may also be an option for small, low-risk cancers.
- Total thyroidectomy is recommended for any cancer that has grown or spread beyond the thyroid.
- RAI therapy will be considered if the results of surgery are very good.
- After a total thyroidectomy, lifelong thyroid hormone replacement therapy is needed. Levothyroxine is almost always used.
- Hormone replacement therapy is not always needed after lobectomy, because the remaining lobe of the thyroid is still making hormones.
- Recurrences are usually diagnosed by laboratory or imaging studies and treated with some combination of surgery, RAI, EBRT, or systemic therapy. Treatment is individualized.

# 3
# Medullary thyroid cancer



The most common types of thyroid cancer start in follicular cells, where thyroid hormone is made. Medullary thyroid carcinoma (MTC) starts in C cells, which make a different hormone called calcitonin. MTC behaves somewhat differently than differentiated thyroid cancers.

About 1 in 4 medullary thyroid cancers is caused by a mutation of the *RET* gene. *RET* mutations can be passed from parent to child (inherited). The hereditary form of medullary thyroid cancer is known as multiple endocrine neoplasia type 2 (MEN2).

Compared to sporadic (non-inherited) medullary thyroid cancer, the hereditary form tends to start at a much younger age and behave more aggressively. For this reason, the thyroid is removed at a very young age in infants and children known to have a *RET* mutation.

Inherited medullary thyroid cancer also tends to spread to lymph nodes or distant parts of the body earlier and more often than non-hereditary medullary thyroid cancer. The cancer can spread to the lungs, liver, or bones.

There are many different mutations of the *RET* gene. Some are more likely to cause thyroid cancer than others. Some are also associated with more aggressive thyroid cancer.

The specific *RET* mutation can affect:

- The overall chance of developing thyroid cancer
- When thyroid cancer starts
- How aggressive/fast-growing the thyroid cancer will be

MEN2A, which includes familial medullary thyroid carcinoma (FMTC), is generally considered moderate risk. In people with MEN2A the parathyroid glands can make too many hormones (hyperparathyroidism) and may need to be removed. MEN2B is caused by higher-risk mutations of the *RET* gene.

## Testing

If a needle biopsy (fine-needle aspiration or “FNA”) diagnoses medullary thyroid cancer, more testing will be ordered. Genetic testing and counseling, blood and laboratory tests, and imaging procedures are used to help plan the best treatment.

### Genetic testing and counseling

Everyone with medullary thyroid cancer found by FNA should be tested for inherited (“germline”) mutations of the *RET* gene. Those who have a *RET* mutation will be referred to a genetic counselor.

This specially trained health professional can explain the test results and provide information, counseling, and support. The counselor can explain what the results mean for members of your family, including whether they should seek testing for the same mutation.

Seeing a genetic counselor is also encouraged before having any testing performed. It can help prepare you for the possible outcomes and what they mean for you and your loved ones.

### Blood tests

Before treatment, blood tests will be ordered to measure the levels of calcitonin, calcium, and carcinoembryonic antigen (CEA). CEA is a protein that can be found in the blood of people with medullary thyroid cancer and some other cancers. It may also be used to check treatment results and monitor for the return of cancer.

### Imaging procedures

If an ultrasound of the thyroid and neck has not yet been done, it is recommended before surgery. Some people will also have an examination of the voice box and vocal cords. This is called laryngoscopy. A vocal cord exam may be helpful in patients with voice changes, invasive cancer, or bulky (large) cancer in the middle of the neck. It may also be ordered in those who have had surgery involving nerves near the voice box.

Other imaging procedures are generally ordered on an as-needed basis. These may include computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), bone scan, and skeletal MRI.

## Staging

The results of the testing described above are used to determine the spread of cancer in the body, also known as the cancer stage. While the stage of medullary thyroid cancer provides helpful information about the extent and prognosis (outlook) of the cancer, it does not guide your treatment. This is because surgery is recommended for all MTCs.

In the early stages of medullary thyroid cancer, the tumor has not spread beyond the thyroid. A 2 cm or smaller tumor (about the size of a peanut) is stage I.

In stage II MTC the tumor is larger than 2 cm. It may have grown into muscles next to the thyroid. In stage III, cancer has spread to nearby lymph nodes. The tumor itself may be small or large.

There are three categories of stage IV (4) medullary thyroid cancer. Stage IVA is moderately advanced disease. The tumor has grown extensively into the neck, or has spread to lymph nodes far from the thyroid.

Stage IVB is considered very advanced disease. Although there is no cancer in nearby lymph nodes, the tumor has invaded critical areas or structures such as the spine, large blood vessels, or the carotid artery.

Stage IVC is the most advanced stage, metastatic. The cancer has spread to areas of the body far from the thyroid.

# Treatment

## Sporadic MTC

Sporadic (non-hereditary) medullary thyroid cancer is treated with surgery to remove the entire thyroid (total thyroidectomy). Depending on the size and location of the tumor, the surgeon may also remove nearby lymph nodes that are known or suspected to have cancer. This is known as neck dissection. Neck dissection may not be needed for some tumors smaller than 1 centimeter (about the size of a pea).

Levothyroxine is given after surgery to replace the hormones no longer being supplied by the thyroid. Hormone replacement therapy is generally needed lifelong after a thyroidectomy. See the following page for information on what to expect after surgery.

## Hereditary MTC

Treatment of both forms of hereditary medullary thyroid cancer (MEN2A and MEN2B) is similar and is described next.

### MEN2A

MEN2A, which includes familial thyroid cancer, is treated using total thyroidectomy. In infants or young children known to have this type of inherited medullary thyroid cancer, it is recommended that the thyroid be removed before age 5.

Lymph nodes near the thyroid may also be removed during surgery. Reasons for removing lymph nodes may include high calcitonin or CEA levels before surgery, or abnormal ultrasound results.

If the parathyroid glands are making too much parathyroid hormone, one or more of the glands may be removed during surgery. Some or all of the tissue of individual parathyroid glands may be removed.

Parathyroid tissue can be removed and transplanted into another area of the body, such as the forearm. Over time, the parathyroid tissue begins to make hormones again. Parathyroid gland tissue can also be frozen and stored outside the body (cryopreservation). This preserves the tissue so that it can be put back in the body at a later date.

Levothyroxine is given after surgery to replace the hormones no longer being supplied by the thyroid. Hormone replacement therapy is generally needed lifelong after a thyroidectomy. See the following page for information on what to expect after surgery.

### MEN2B

Like MEN2A, MEN2B is treated using total thyroidectomy. In infants known to have this type of inherited medullary thyroid cancer, it is recommended that the thyroid be removed by age 1.

In addition to the thyroid gland, any neck lymph nodes known or suspected to have cancer will be removed. Lymph nodes without cancer may also be removed in order to prevent cancer cells from spreading to them.

Levothyroxine is given after surgery to replace the hormones no longer being supplied by the thyroid. Hormone replacement therapy is generally needed lifelong after a thyroidectomy. See the following page for information on what to expect after surgery.

## After surgery

After a thyroidectomy, the best way to monitor for the return of medullary thyroid cancer is to check the levels of calcitonin and CEA on a regular basis. The calcitonin level after surgery is particularly important. The lower the calcitonin level, the better.

The first blood test will take place 2 to 3 months after surgery. It is important to wait a few months before testing because it takes time for the calcitonin level to drop after the thyroid is removed.

When surgery is planned in a child, thyroidectomy should be performed by a surgeon and a team experienced in performing pediatric thyroid surgery.

### Normal blood test results

If the first blood test after surgery does not detect calcitonin and CEA is within normal range, the cancer is likely cured. Going forward, the calcitonin and CEA levels should be measured every year. If either level begins to rise, further testing and workup are needed.

In addition to annual calcitonin and CEA testing, yearly testing for pheochromocytoma is recommended for people with an inherited medullary thyroid cancer (MEN2A or MEN2B). In those with MEN2A, yearly testing for hyperparathyroidism is also recommended.

### Abnormal blood test results

If the first blood test after surgery finds calcitonin, or if the level of CEA is high, the cancer may not have been completely removed during surgery. Or, the cancer may have returned or spread.

Imaging tests of the neck, liver, chest, and/ or bones may be ordered to look for cancer. If the imaging procedures find cancer, or if you are having symptoms, see the next section, "*Recurrence or spread*."

If the imaging tests do not find anything concerning and you are not having symptoms, you will be closely monitored. Blood tests to measure calcitonin and CEA are recommended every 6 to 12 months. Depending on how quickly the levels are rising, imaging procedures or more frequent testing may be needed. In some cases, another surgery may be considered to remove remaining cancer.

# Recurrence or spread

### Cancer that returns to the neck

Surgery is the preferred treatment for medullary thyroid cancer that returns to the neck area. If surgery is not possible, external beam radiation therapy (EBRT) may be used instead. Taking a watch-and-wait approach by monitoring the cancer can also be an appropriate option for some recurrent medullary thyroid cancers.

If the cancer cannot be removed using surgery and is causing symptoms or getting worse (progressing), targeted therapy is often a treatment option. At this time, preferred targeted therapies include:

- Vandetanib (Caprelsa)
- Cabozantinib (Cabometyx)
- Selpercatinib (Retevmo) (for *RET* mutation-positive cancers)
- Pralsetinib (Gavreto) (for *RET* mutation-positive cancers)

The immunotherapy drug pembrolizumab (Keytruda) may also be an option for tumors with a high tumor mutational burden (TMB). Tumors with this biomarker have a large number of mutations.

### Metastatic cancer

Treatment of metastatic medullary thyroid cancer depends in part on whether the cancer is causing symptoms. If the cancer is stable and is not causing symptoms, treatment may not be needed. Surgery, ablation, or other techniques to remove or destroy the metastases will be considered.

If the cancer progresses (gets worse) and begins causing symptoms, systemic therapy is often a treatment option. The same targeted therapies listed above are also preferred for metastatic disease. If the preferred therapies are not available or effective, other small molecule kinase inhibitors may be considered. Chemotherapy that includes the drug dacarbazine (“DTIC”) may also be an option.

Radiation therapy may be used to help with symptoms, or as an ablative treatment in some cases. Surgery, ablation, or other techniques may be used to treat metastases in order to relieve symptoms.

If the cancer has spread to bone, intravenous bisphosphonates or denosumab are recommended. These are bone-strengthening medications that can help relieve symptoms and slow damage caused by bone metastases.

Joining a clinical trial is strongly encouraged for everyone with metastatic thyroid cancer. Ask your treatment team if there is an open clinical trial you might be eligible for. See page 17 for more information on clinical trials.

Supportive care plays an essential role in the care of people with metastatic thyroid cancer. In addition to providing relief from symptoms caused by cancer and its treatment, supportive care can provide emotional, spiritual, and social support.

## Key points

- Medullary thyroid cancer starts in the C cells of the thyroid. The C cells make a hormone called calcitonin.
- About 1 out of 4 medullary thyroid cancers is inherited.
- Inherited medullary thyroid cancer is caused by mutations of the *RET* gene.
- Any person diagnosed with medullary thyroid cancer using FNA (needle biopsy) should be tested for *RET* mutations and offered genetic counseling.
- Inherited medullary thyroid cancer is known as multiple endocrine neoplasia type 2 (MEN2).
- All medullary thyroid cancers are treated with total thyroidectomy.
- Blood tests to measure CEA and calcitonin are recommended to monitor for the return of medullary thyroid cancer.
- Surgery is the preferred treatment for cancer that returns to the neck. Other options may include radiation therapy, monitoring (no treatment), and targeted therapy.
- Surgery, radiation therapy, or other techniques may be used to remove or destroy metastases and relieve symptoms.
- Supportive care can help relieve symptoms caused by medullary thyroid cancer and its treatment.

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NCCN.org/patients/feedback

# 4

# Anaplastic thyroid cancer



Anaplastic carcinoma is the least common and most aggressive type of thyroid cancer. About half of people with this type have (or had) a more common type of thyroid cancer. Anaplastic thyroid cancer generally cannot be cured. Supportive care is essential throughout the treatment process.

## Testing and staging

If a needle biopsy diagnoses anaplastic thyroid carcinoma (ATC), more testing is needed to confirm the diagnosis and learn the extent of the cancer. Testing typically includes:

- Blood tests, including thyroid-stimulating hormone (TSH)
- Imaging procedures to see inside the head, neck, chest, abdomen, pelvis, voice box (larynx), and airway (trachea)

To help determine whether you are eligible for treatment with targeted therapy or immunotherapy, biomarker testing is also recommended. Testing should include the biomarkers listed below. See page 15 for more information on these biomarkers.

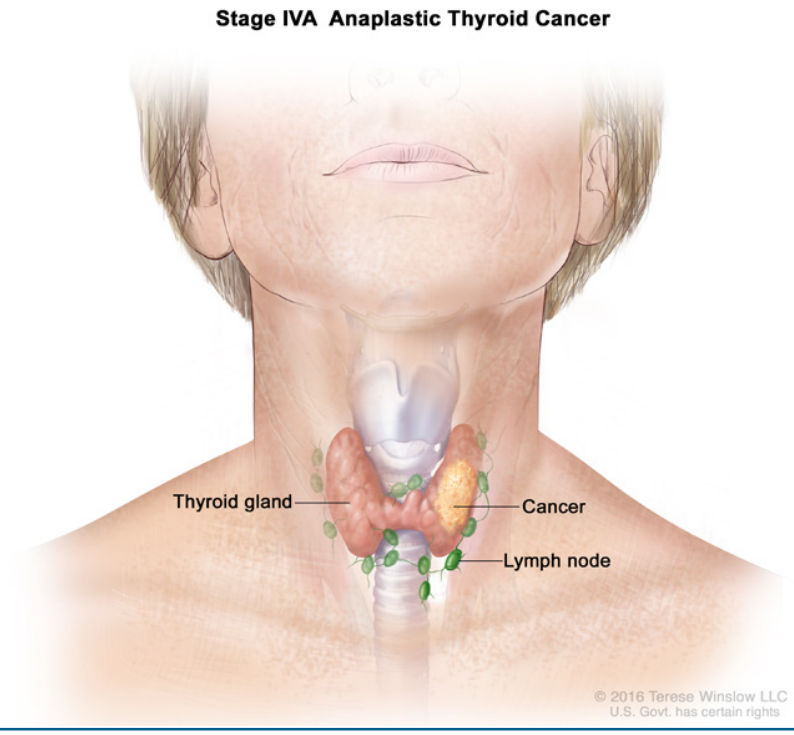
- *BRAF* V600E mutations
- *NTRK* gene fusion
- *ALK* gene fusion
- *RET* gene fusion
- DNA mismatch repair deficiency (dMMR)
- Microsatellite instability (MSI)
- Tumor mutational burden (TMB)

The results of imaging are used to determine the spread of cancer in the body, also known as the cancer stage.

All anaplastic thyroid cancers are stage IV (4). The letters A, B, and C are used to describe how far the cancer has spread at the time it is found. Stages IVA and IVB are nonmetastatic. The cancer is either only in the thyroid (stage IVA) or has grown into the neck or spread to nearby lymph nodes (IVB). Stage IVC is metastatic disease. The cancer has spread to areas of the body far from the thyroid.

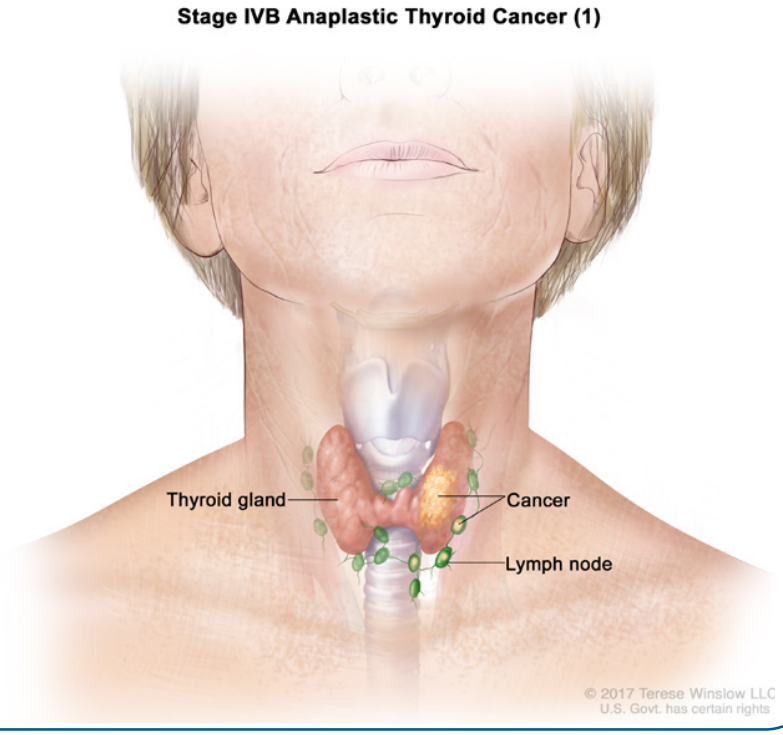
## Stage IVA

**In stage IVA anaplastic thyroid cancer, the cancer has not grown or spread beyond the thyroid. The tumor may be small or large.**



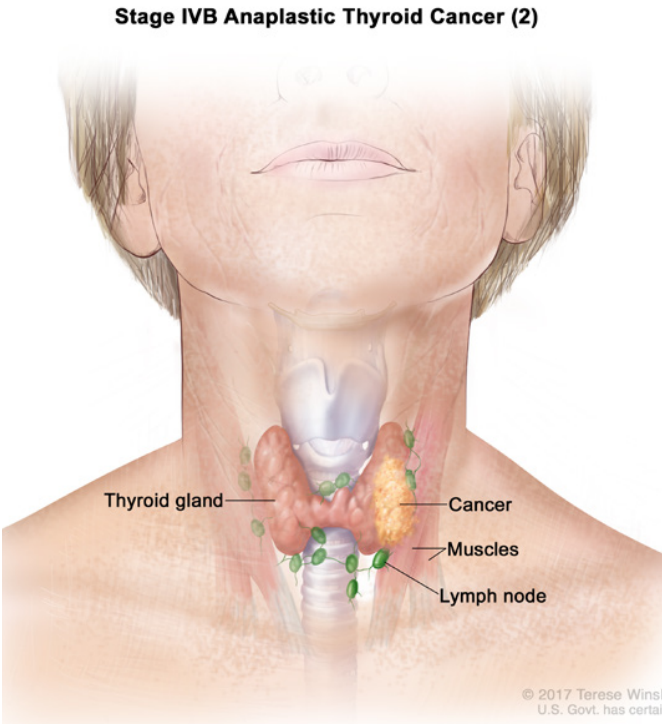

## Stage IVB

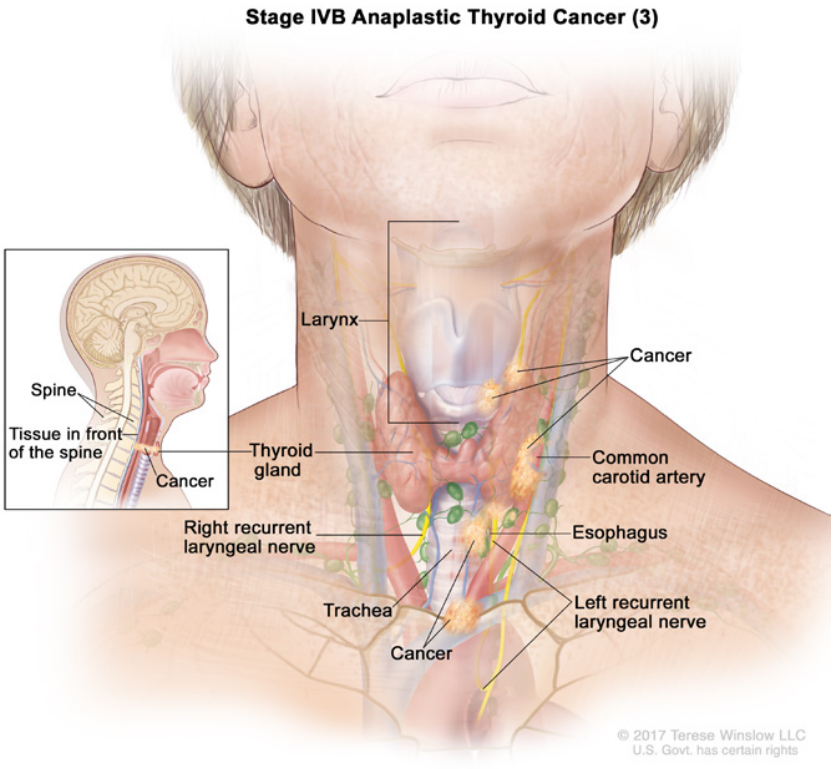
**In stage IVB anaplastic thyroid cancer, the cancer may have spread only to nearby lymph nodes, as shown here.**



## Stage IVB (cont.)

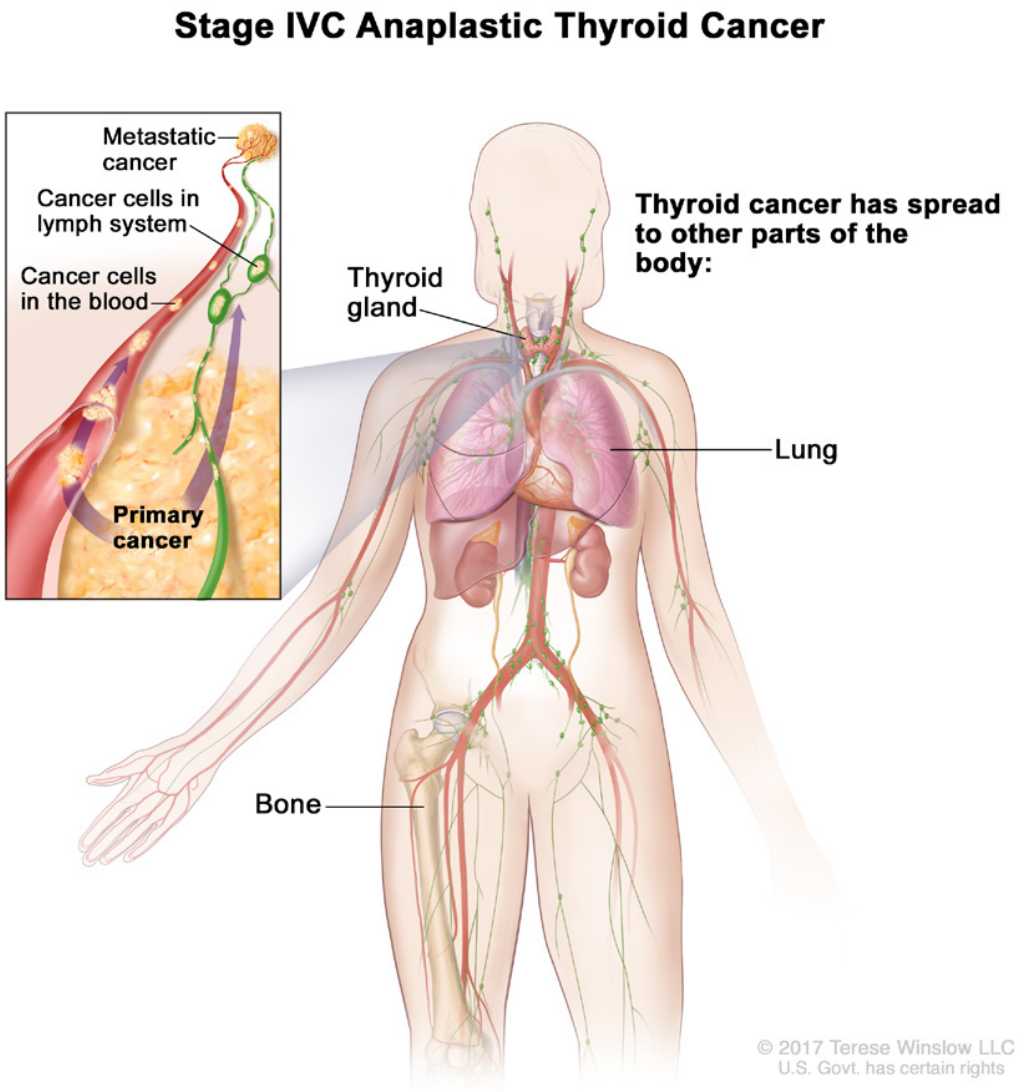
**Stage IVB also describes ATC that has grown into neck muscles next to the thyroid (top right) or grown extensively into the neck (bottom right).**



## Stage IVC

**Stage IVC is metastatic disease. The cancer has spread to areas of the body far from the thyroid.**



## Non-metastatic ATC

Treatment for non-metastatic anaplastic thyroid cancer (stages IVA and IVB) depends on whether the tumor can safely be removed using surgery. If surgery is an option, the entire thyroid is removed (total thyroidectomy). Nearby lymph nodes known or suspected to have cancer are also removed.

If surgery successfully removes all of the cancer, or if only tiny amounts remain, external beam radiation therapy (EBRT) is next. The purpose is to kill microscopic leftover cancer cells in and around the cancer site.

Your doctor may recommend chemotherapy in addition to EBRT. When given with radiation, some chemotherapy medicines make it easier for radiation to kill cancer cells. This is called radiosensitizing chemotherapy. Treatment with both EBRT and chemotherapy during the same time period is known as chemoradiation.

A 2- to 3-week recovery period is recommended after surgery, before EBRT (and possibly also chemotherapy) is started.

### If surgery is not an option

If the cancer cannot be safely removed using surgery, EBRT is recommended. Chemotherapy may be given in addition to radiation therapy.

The cancer may be “borderline” resectable. This means that surgery is not an option right away due to the size and/or location of the tumor, but it may become possible. In this case, if the cancer has one or more specific biomarkers, your doctor may recommend treatment with targeted therapy.

Recommended targeted therapies are listed below by biomarker.

- *BRAF* V600E mutation: Dabrafenib (Tafinlar) and trametinib (Mekinist) together
- *RET* fusion-positive tumors: Selpercatinib (Retevmo) or pralsetinib (Gavreto)
- *NTRK* gene fusion-positive tumors: Larotrectinib (Vitrakvi) or entrectinib (Rozlytrek)

After treatment with either radiation therapy or targeted therapy, surgery may become an option. This will depend on the size of the tumor after treatment and other factors.

## Metastatic ATC

If anaplastic thyroid cancer spreads to distant areas of the body, there may be more than one approach to treatment. Some people choose to treat the cancer aggressively. Others choose to maximize their quality of life. Talk to your care team about the approach that aligns with your health and personal preferences.

Anaplastic thyroid cancer grows quickly and can become quite large. Over time, the tumor may block the airway (trachea or "windpipe") or cause other airway-related problems. Hoarseness, noisy breathing (stridor), and shortness of breath (dyspnea) are possible signs of a blocked airway.

Whether you choose to treat the cancer aggressively or to maximize quality of life, your doctor may suggest tracheostomy. Tracheostomy is surgery to create an opening (called a stoma) in the windpipe.

This type of surgery is typically done in an operating room under general anesthesia. An incision called a tracheotomy is made into the trachea (windpipe). A curved tube is placed into the newly created opening (the tracheostomy). The tracheostomy tube provides an airway used for breathing.

The decision to have a tracheostomy, and when, can be a difficult one for patients with

**Guide 2**
**Systemic therapy for metastatic anaplastic thyroid cancer**

| | |
|---|---|
| **Preferred options** | **Targeted therapy**<br>• ***BRAF* V600E positive cancers:** Dabrafenib (Tafinlar) + trametinib (Mekinist)<br>• ***NTRK* gene fusion-positive cancers:** Larotrectinib (Vitrakvi) or entrectinib (Rozlytrek)<br>• ***RET* fusion-positive cancers:** Selpercatinib (Retevmo) or pralsetinib (Gavreto) |
| **Other recommended options** | **Chemotherapy**<br>• Paclitaxel, alone or with carboplatin<br>• Doxorubicin, alone or with docetaxel |
| **Useful in some cases** | • Chemotherapy with doxorubicin and cisplatin<br>• For **tumor mutational burden-high (TMB-H) cancers**, immunotherapy with pembrolizumab (Keytruda) |

ATC and their caregivers. Your treatment team can provide information on the benefits and risks of tracheostomy for you, taking into consideration your cancer and goals.

### Option: Aggressive treatment

If you and your treatment team decide on this option, all of the following treatments may be used together to fight the cancer:

- Total thyroidectomy and lymph node dissection
- Radiation therapy
- Systemic therapy (eg, targeted therapy or chemotherapy) (see Guide 2)

Joining a clinical trial may be another option. Participation in clinical trials is strongly encouraged for all patients with metastatic anaplastic thyroid cancer. Ask your treatment team if there are any open trials that you may be eligible for. See page 17 for more information.

### Option: Maximize quality of life

Aggressive treatment is not an option for everyone with metastatic anaplastic thyroid cancer. It may not be recommended for health reasons, or it may not align with your preferences. Everyone's cancer and priorities are different. For some, living as comfortably as possible for as long as possible is preferred to undergoing harsh treatments.

In this approach, the thyroid is not removed. Surgery, radiation therapy, or both are used to control cancer growth throughout the body. Removing or destroying areas of cancer directly can help relieve symptoms caused by cancer in the neck or distant areas.

If anaplastic thyroid cancer has spread to bones, denosumab (Prolia) or medications called bisphosphonates may be given to help strengthen your bones, slow bone damage, and relieve symptoms caused by the tumors.

Supportive care plays an essential role in the care of patients with anaplastic thyroid cancer.

See *Part 5: Survivorship* for more information on the range of care that is available and important for cancer survivors.

## Important conversations

Important, often difficult, discussions are needed after a diagnosis of anaplastic thyroid cancer. These discussions can help with making decisions about treatment and other care.

### Prognosis

Prognosis refers to the expected outcome or course of an individual cancer. The prognosis for most anaplastic thyroid cancers is poor, meaning that good outcomes are unlikely. Discussing prognosis is an important part of care planning for anaplastic thyroid cancer. Your prognosis can affect the type and number of treatments that you may be willing, or able, to receive.

### Weigh treatment options

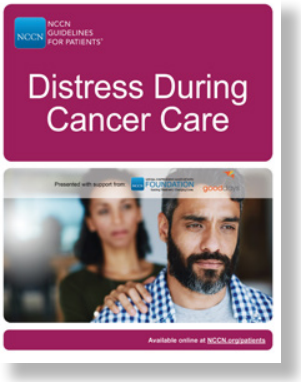
Consider and discuss the goals of treatment with your care team. Care to improve quality of life may be more helpful than cancer treatment. Talk to your doctor about your treatment options. For example, controlling the tumor growth may be preferred to aggressive treatment. Participation in clinical trials is strongly recommended for all patients with anaplastic thyroid cancer. Talk to your treatment team about clinical trials you may be eligible for.

### Palliative care

Supportive care is available for everyone with anaplastic thyroid cancer. Supportive care can provide relief from symptoms as well as emotional, social, and spiritual support. Your doctor may suggest hospice care during this time.

Hospice care can help with the physical and emotional needs of anaplastic thyroid cancer.

See *NCCN Guidelines for Patients: Distress During Cancer Care*, available at NCCN.org/patientguidelines.




## Monitoring and management

Imaging procedures (CT or MRI) of the brain, neck, chest, abdomen, and pelvis are needed on a regular basis for metastatic anaplastic thyroid cancer. There is not a one-size-fits-all schedule for these scans. Talk to your treatment team about how often imaging procedures are needed. A combined PET/CT scan may be ordered 3 to 6 months after treatment of metastatic disease to determine the extent of the cancer.

If surveillance testing continues to find no evidence of disease (NED), monitoring will continue. Surgery, radiation therapy, or both are used to control cancer growth throughout the body. If the cancer returns or gets worse (progresses), trying a different systemic therapy may be an option. Joining a clinical trial is strongly encouraged if one is available to you.

### Survivorship

In addition to surveillance testing, a range of other care is important for cancer survivors. See *Part 5: Survivorship* for more information.

# Key points

- Anaplastic is the least common and most aggressive type of thyroid cancer.
- All anaplastic thyroid cancers are stage IV (4). The letters A, B, and C are used to describe how far the cancer has spread at the time it is found.

### Non-metastatic cancer (stages IVA and IVB)

- If surgery is possible, non-metastatic ATC is treated with total thyroidectomy and lymph node dissection.
- Radiation therapy—and sometimes also chemotherapy—is used to kill cancer cells remaining after surgery.
- If surgery is not an option, treatment with radiation therapy (and possibly chemotherapy) is recommended.
- If the cancer has biomarkers, treatment with targeted therapy may be an option instead of radiation therapy.
- For borderline resectable cancers, shrinking the tumor with targeted therapy may be an option.
- If treatment with radiation therapy or targeted therapy works well, surgery may be an option.

### Metastatic cancer (stage IVC)

- Treatment of metastatic anaplastic thyroid cancer may focus on maximizing quality of life rather than treating the cancer.
- Aggressive therapy for metastatic cancer includes total thyroidectomy, radiation therapy, and systemic therapy.

### Support

- Supportive care is available and is essential for everyone with anaplastic thyroid cancer.
- Supportive care can help relieve the physical side effects of cancer and its treatment. It can also provide mental, social, and spiritual care and support.

# 5
# Survivorship



Survivorship focuses on the physical, emotional, and financial issues unique to cancer survivors. Managing the long-term side effects of cancer and its treatment, staying connected with your primary care doctor, and living a healthy lifestyle are important parts of survivorship.

Thyroid cancer survivors may experience long-term health effects of cancer and its treatment. Such side effects can include:

- Osteoporosis
- High blood pressure
- Heart rhythm disorders
- Heart valve disease

These effects are different for everyone and depend in part on the treatment(s) received. Surgery, radiation therapy, RAI therapy, and hormone replacement therapy all have unique potential side effects.

Staying connected with your primary care doctor and adopting healthy habits can help prevent or offset long-term side effects of cancer treatment. It can also help lower the risk of getting other types of cancer.

Cancer survivors face a unique financial burden. Paying for doctor visits, tests, and treatments can become unmanageable, especially for those with little or no health insurance. You may also have costs not directly related to treatment, such as travel expenses and the cost of childcare or missed work. The term financial toxicity is used to describe the problems patients face related to the cost of medical care. Financial toxicity can affect your quality of life and access to needed health care. If you need help paying for your cancer care, financial assistance may be available. Talk with a patient navigator, your treatment team's social worker, and your hospital's financial services department. Several of the resources listed on page 59 contain helpful information on paying for cancer care.

## Your primary care doctor

After finishing cancer treatment, your primary care doctor, also known as a general practitioner (GP) or primary care physician (PCP), will play an important role in your care. Your oncologist (cancer doctor) and PCP should work together to make sure you get the follow-up care you need. Your oncologist will develop a written survivorship care plan that includes:

- A summary of your cancer treatment history, including surgeries, radiation treatments, and chemotherapy
- A description of possible short-term, late, and long-term side effects
- Recommendations for monitoring for the return of cancer
- Information on when your care will be transferred to your PCP
- Clear roles and responsibilities for both your cancer care team and your PCP
- Recommendations on your overall health and well-being

## Healthy habits

Monitoring for the return of cancer is important after finishing treatment. But, it is also important to keep up with other aspects of your health. Steps you can take to help prevent other health issues and to improve your quality of life are described next.

Get screened for other types of cancer, such as breast, colorectal, and skin cancer. Your primary care doctor should tell you what cancer screening tests you should have based on your age and risk level.

Get other recommended health care for your age, such as blood pressure screening, hepatitis C screening, and immunizations (such as the flu shot).

Leading a healthy lifestyle includes maintaining a healthy body weight. Try to exercise at a moderate intensity for at least 150 minutes per week. All patients should have a discussion with their doctor before starting a new exercise regimen. Eat a healthy diet with lots of plant-based foods, including vegetables, fruits, and whole grains.

Radiation treatment can weaken bones, putting you at increased risk of fractures. Your doctor may want to start monitoring the density of your bones.

Alcohol may increase the risk of certain cancers. Drink little to no alcohol.

If you are a smoker, quit! Counseling and other resources are available. Your treatment team can help.

### Complementary and alternative therapies

Complementary and alternative therapies may help with side effects and improve comfort and well-being during and after cancer treatment. Some of these practices and products include:

Acupuncture
Dietary supplements
Eastern medicine
Medical marijuana
Herbal teas and preparations
Homeopathy
Hypnosis
Meditation
Reiki
Yoga
Massage therapy

If you have questions or are curious about complementary therapies, talk to your treatment team. Many cancer centers have integrative oncology programs. Integrative oncology is an approach to cancer care that combines conventional (standard) cancer treatment with complementary and alternative therapies.

## More information

For more information on cancer survivorship, the following are available at NCCN.org/patientguidelines:

- *Survivorship Care for Healthy Living*
- *Survivorship Care for Cancer-Related Late and Long-Term Effects*


These resources address many topics relevant to cancer survivors, including:

- Anxiety, depression, and distress
- Cognitive dysfunction
- Fatigue
- Pain
- Sexual dysfunction
- Sleep disorders
- Healthy lifestyles
- Immunizations
- Employment, insurance, and disability concerns

## Key points

- Survivorship focuses on the physical, emotional, and financial issues unique to cancer survivors.
- Your oncologist and primary care doctor should work together to make sure you get the follow-up care you need.
- A survivorship care plan is helpful in transitioning your care to your primary care doctor.
- Healthy habits, including exercising and eating right, play an important role in helping to prevent other diseases and second cancers.

# 6
# Making treatment decisions



It is important to be comfortable with the cancer treatment you choose. This choice starts with having an open and honest conversation with your doctor.

## It's your choice

In shared decision-making, you and your doctors share information, discuss the options, and agree on a treatment plan. It starts with an open and honest conversation between you and your doctor.

Treatment decisions are very personal. What is important to you may not be important to someone else.

Some things that may play a role in your decision-making:

- What you want and how that might differ from what others want
- Your religious and spiritual beliefs
- Your feelings about certain treatments like surgery, radiation, or chemotherapy
- Your feelings about pain or side effects such as nausea and vomiting
- Cost of treatment, travel to treatment centers, and time away from work
- Quality of life and length of life
- How active you are and the activities that are important to you

Think about what you want from treatment. Discuss openly the risks and benefits of specific treatments and procedures. Weigh options and share concerns with your doctor. If you take the time to build a relationship with your doctor, it will help you feel supported when considering options and making treatment decisions.

### Second opinion

It is normal to want to start treatment as soon as possible. While cancer should not be ignored, there is time to have another doctor review your test results and suggest a treatment plan. This is called getting a second opinion, and it's a normal part of cancer care. Even doctors get second opinions!

Things you can do to prepare:

- Check with your insurance company about its rules on second opinions. There may be out-of-pocket costs to see doctors who are not part of your insurance plan.
- Make plans to have copies of all your records sent to the doctor you will see for your second opinion.

### Support groups

Many people diagnosed with cancer find support groups to be helpful. Support groups often include people at different stages of treatment. Some people may be newly diagnosed, while others may be finished with treatment. If your hospital or community doesn't have support groups for people with cancer, check out the websites listed in this book.

## Questions to ask your doctors

Possible questions to ask your doctors are listed on the following pages. Feel free to use these or come up with your own. Be clear about your goals for treatment and find out what to expect from treatment. Keep a notebook handy to record answers to your questions.

## Questions to ask your doctors about testing

1. What tests will I have for thyroid cancer?
2. Where and when will the tests take place?
3. How long will they take?
4. What are the risks?
5. How do I prepare for testing?
6. How soon will I know the results and who will explain them to me?
7. Have any cancer cells spread to other parts of my body?
8. Can you tell me about the symptoms of thyroid cancer?
9. What will happen if the thyroid nodule is not cancer? What tests will I have to assess the nodule?

# Questions to ask your doctors about treatment

1. What are my treatment options? Which do you recommend?
2. Does this hospital or center offer the best treatment for me?
3. Will my age, general health, and other factors affect my treatment choices?
4. How much time do I have to think about my options? Is there time to get a second opinion?
5. What can I do to prepare for treatment?
6. How long will I be in the hospital after surgery? How soon can I return to my normal activities?
7. What symptoms should I look out for during treatment?
8. How much will the treatment cost? How can I find out how much my insurance company will cover?
9. How likely is it that I'll be cancer-free after treatment?
10. What is the chance that the cancer will come back?

## Questions to ask your doctors about side effects

1. What are the side effects of surgery?
2. What are the side effects of RAI therapy?
3. What are the side effects of external beam radiation therapy (EBRT)?
4. What are the side effects of systemic therapy?
5. When can they start? How long will the side effects last?
6. When should I contact the care team about my side effects?
7. Are there any medications that can prevent or relieve these side effects?
8. Are there any long-term effects of this treatment?

# Questions to ask your doctors about clinical trials

1. Is there a clinical trial I can join?
2. What is the purpose of the study?
3. How many people will be in the clinical trial?
4. What are the tests and treatments for this study (including placebos)? How often will they take place?
5. Has the treatment been used before? Has it been used for other types of cancers?
6. What side effects can I expect from the treatment? Can the side effects be controlled?
7. How long will I be in the clinical trial?
8. How will you know the treatment is working?
9. Will I be able to get other treatment if this treatment doesn't work?
10. Who will help me understand the costs of the clinical trial?

## What is your experience?

1. Are you board-certified? If yes, in what area?
2. How many patients like me have you treated?
3. How many procedures like the one you're suggesting have you done?
4. Is this treatment a major part of your practice?
5. How many of your patients have had complications?

# Resources

**American Cancer Society**
cancer.org/cancer/thyroid-cancer.html

**American Thyroid Association (ATA)**
thyroid.org/patient-thyroid-information

**CancerCare**
cancercare.org

**Cancer.Net**
cancer.net/cancer-types/thyroid-cancer

**Cancer Support Community**
cancersupportcommunity.org

**Head and Neck Cancer Alliance**
headandneck.org

**LID Life Community**
lidlifecommunity.org

**Light of Life Foundation**
checkyourneck.com

**National Cancer Institute (NCI)**
cancer.gov/types/thyroid

**National Coalition for Cancer Survivorship**
canceradvocacy.org

**PAN Foundation**
panfoundation.org

**Support for People with Oral and Head and Neck Cancer (SPOHNC)**
spohnc.org

**THANC Foundation**
thancfoundation.org

**Thyroid Care Collaborative (TCC)**
thyroidccc.org

**ThyCa: Thyroid Cancer Survivors' Association, Inc.**
thyca.org

**U.S. National Library of Medicine Clinical Trials Database**
clinicaltrials.gov


**Take our survey**
**And help make the NCCN Guidelines for Patients better for everyone!**

NCCN.org/patients/comments

# Words to know

**anaplastic thyroid cancer**
A rare and aggressive type of thyroid cancer. Anaplastic cells look very different from normal thyroid cells. Also called anaplastic thyroid carcinoma (ATC).

**biomarkers**
Specific features of cancer cells. Biomarkers can include proteins made in response to the cancer and changes (mutations) in the DNA of the cancer cells.

**biopsy**
Removal of small amounts of tissue or fluid to be tested for disease.

**C cells**
Cells in the thyroid that make calcitonin. These cells are also called parafollicular cells.

**calcitonin**
A hormone made by the C cells of the thyroid gland. It helps control the calcium level in the blood.

**central nervous system**
The brain and spinal cord.

**chemotherapy**
Drugs that work throughout the body to kill cancer cells.

**clinical trial**
Research on a test or treatment to assess its safety or how well it works.

**computed tomography (CT)**
A test that uses x-rays to view body parts.

**contrast**
A substance put into your body to make clearer pictures during imaging tests.

**follicular thyroid cancer**
The second most common type of thyroid cancer. Starts in follicular cells and invades blood vessels in and around the thyroid. Also called follicular thyroid carcinoma (FTC).

**hormone**
One of many substances made by glands in the body. Some hormones can also be made in the laboratory. Hormones circulate in the bloodstream and control the actions of certain cells or organs.

**Hürthle cell thyroid cancer**
An uncommon and often more aggressive type of differentiated thyroid cancer. Also called Hürthle cell carcinoma (HCC).

**magnetic resonance imaging (MRI)**
A test that uses radio waves and powerful magnets to make pictures of the insides of the body.

**medullary thyroid cancer**
A type of thyroid cancer that starts in the C cells that make calcitonin. About 1 out of 4 medullary thyroid cancers is caused by inherited mutations of the *RET* gene. Also called medullary thyroid carcinoma (MTC).

**metastasis**
The spread of cancer cells from the first tumor to another body part.

**multidisciplinary team**
A group of health care professionals who are experts in different areas of cancer treatment.

**neck dissection**
Removal of the lymph nodes and other tissue in the neck area.

**noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP)**
A low-risk, noninvasive thyroid tumor. Formerly known as encapsulated follicular variant of papillary thyroid cancer.

## Words to know

**nodule**
A small mass of abnormal tissue.

**observation**
A period of scheduled follow-up testing to watch for signs of cancer spread (metastasis) or return (recurrence).

**papillary thyroid cancer**
The most common type of thyroid cancer. Starts in follicular cells. Also called papillary thyroid carcinoma (PTC).

**parathyroid gland**
One of four small glands near the thyroid that make parathyroid hormone.

**pathologist**
An expert in examining cells and tissues to diagnose disease.

**pathology report**
A document with information about cells and tissues removed from the body and examined with a microscope for disease.

**pituitary gland**
A gland found near the base of the brain. It makes hormones that control how other glands in the body work or make hormones.

**positron emission tomography (PET)**
A test that uses radioactive material to see the shape and function of body parts.

**prognosis**
The expected pattern and outcome of a disease.

**supportive care**
Care given to improve the quality of life of patients who have a serious or life-threatening disease. Also called palliative care.

**thyroid**
A gland located beneath the larynx (voice box) that makes thyroid hormone and calcitonin. The thyroid gland helps regulate growth and metabolism.

**Thyrogen**
A form of thyroid-stimulating hormone (TSH) made in the laboratory. It is used to test for remaining or recurring cancer cells in patients who have been treated for thyroid cancer. Also called thyrotropin alfa.

**thyroxine**
A hormone that is made by the thyroid gland and contains iodine. Also called T4.

**triiodothyronine**
A thyroid hormone. Also called T3.

**tumor**
An abnormal mass of cells.

# NCCN Contributors

This patient guide is based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Thyroid Carcinoma, Version 2.2022. It was adapted, reviewed, and published with help from the following people:

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# NCCN Cancer Centers

Abramson Cancer Center
at the University of Pennsylvania
*Philadelphia, Pennsylvania*
*800.789.7366 • pennmedicine.org/cancer*

Case Comprehensive Cancer Center/
University Hospitals Seidman Cancer
Center and Cleveland Clinic Taussig
Cancer Institute
*Cleveland, Ohio*
*800.641.2422 • UH Seidman Cancer Center*
*uhhospitals.org/services/cancer-services*
*866.223.8100 • CC Taussig Cancer Institute*
*my.clevelandclinic.org/departments/cancer*
*216.844.8797 • Case CCC*
*case.edu/cancer*

City of Hope National Medical Center
*Los Angeles, California*
*800.826.4673 • cityofhope.org*

Dana-Farber/Brigham and Women's
Cancer Center | Massachusetts General
Hospital Cancer Center
*Boston, Massachusetts*
*617.732.5500 • youhaveus.org*
*617.726.5130*
*massgeneral.org/cancer-center*

Duke Cancer Institute
*Durham, North Carolina*
*888.275.3853 • dukecancerinstitute.org*

Fox Chase Cancer Center
*Philadelphia, Pennsylvania*
*888.369.2427 • foxchase.org*

Fred & Pamela Buffett Cancer Center
*Omaha, Nebraska*
*402.559.5600 • unmc.edu/cancercenter*

Fred Hutchinson Cancer
Research Center/Seattle
Cancer Care Alliance
*Seattle, Washington*
*206.606.7222 • seattlecca.org*
*206.667.5000 • fredhutch.org*

Huntsman Cancer Institute
at the University of Utah
*Salt Lake City, Utah*
*800.824.2073 • huntsmancancer.org*

Indiana University
Melvin and Bren Simon
Comprehensive Cancer Center
*Indianapolis, Indiana*
*888.600.4822 • www.cancer.iu.edu*

Mayo Clinic Cancer Center
*Phoenix/Scottsdale, Arizona*
*Jacksonville, Florida*
*Rochester, Minnesota*
*480.301.8000 • Arizona*
*904.953.0853 • Florida*
*507.538.3270 • Minnesota*
*mayoclinic.org/cancercenter*

Memorial Sloan Kettering
Cancer Center
*New York, New York*
*800.525.2225 • mskcc.org*

Moffitt Cancer Center
*Tampa, Florida*
*888.663.3488 • moffitt.org*

O'Neal Comprehensive
Cancer Center at UAB
*Birmingham, Alabama*
*800.822.0933 • uab.edu/onealcancercenter*

Robert H. Lurie Comprehensive Cancer
Center of Northwestern University
*Chicago, Illinois*
*866.587.4322 • cancer.northwestern.edu*

Roswell Park Comprehensive
Cancer Center
*Buffalo, New York*
*877.275.7724 • roswellpark.org*

Siteman Cancer Center at Barnes-
Jewish Hospital and Washington
University School of Medicine
*St. Louis, Missouri*
*800.600.3606 • siteman.wustl.edu*

St. Jude Children's
Research Hospital/
The University of Tennessee
Health Science Center
*Memphis, Tennessee*
*866.278.5833 • stjude.org*
*901.448.5500 • uthsc.edu*

Stanford Cancer Institute
*Stanford, California*
*877.668.7535 • cancer.stanford.edu*

The Ohio State University
Comprehensive Cancer Center -
James Cancer Hospital and
Solove Research Institute
*Columbus, Ohio*
*800.293.5066 • cancer.osu.edu*

The Sidney Kimmel Comprehensive
Cancer Center at Johns Hopkins
*Baltimore, Maryland*
*410.955.8964*
*www.hopkinskimmelcancercenter.org*

The University of Texas
MD Anderson Cancer Center
*Houston, Texas*
*844.269.5922 • mdanderson.org*

UC Davis
Comprehensive Cancer Center
*Sacramento, California*
*916.734.5959 • 800.770.9261*
*health.ucdavis.edu/cancer*

UC San Diego Moores Cancer Center
*La Jolla, California*
*858.822.6100 • cancer.ucsd.edu*

UCLA Jonsson
Comprehensive Cancer Center
*Los Angeles, California*
*310.825.5268 • cancer.ucla.edu*

UCSF Helen Diller Family
Comprehensive Cancer Center
*San Francisco, California*
*800.689.8273 • cancer.ucsf.edu*

University of Colorado Cancer Center
*Aurora, Colorado*
*720.848.0300 • coloradocancercenter.org*

University of Michigan
Rogel Cancer Center
*Ann Arbor, Michigan*
*800.865.1125 • rogelcancercenter.org*

University of Wisconsin
Carbone Cancer Center
*Madison, Wisconsin*
*608.265.1700 • uwhealth.org/cancer*

UT Southwestern Simmons
Comprehensive Cancer Center
*Dallas, Texas*
*214.648.3111 • utsouthwestern.edu/simmons*

Vanderbilt-Ingram Cancer Center
*Nashville, Tennessee*
*877.936.8422 • vicc.org*

Yale Cancer Center/
Smilow Cancer Hospital
*New Haven, Connecticut*
*855.4.SMILOW • yalecancercenter.org*

# Notes

# Index

# DR SHIVAM SHINGLA

**BSES MG Hospital (Andheri):**
**9 am to 10 am (Monday to Friday)**
**Nanavati Max Hospital (Vile Parle):**
**10 am to 12 pm (Monday to Saturday)**
**S. L. Raheja Hospital (Mahim):**
**12 pm to 4 pm (Monday to Saturday)**
**Suvarna Hospital (Borivali):**
**5 pm to 6 pm (Monday and Friday)**
**Sushrut Hospital (Chembur):**
**By appointment**
**Hinduja Hospital (Khar): By appointment**
**Galaxy Healthcare (Borivali): By appointment**


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**#Reference From NCCN Guidelines**