

National Cancer Institute

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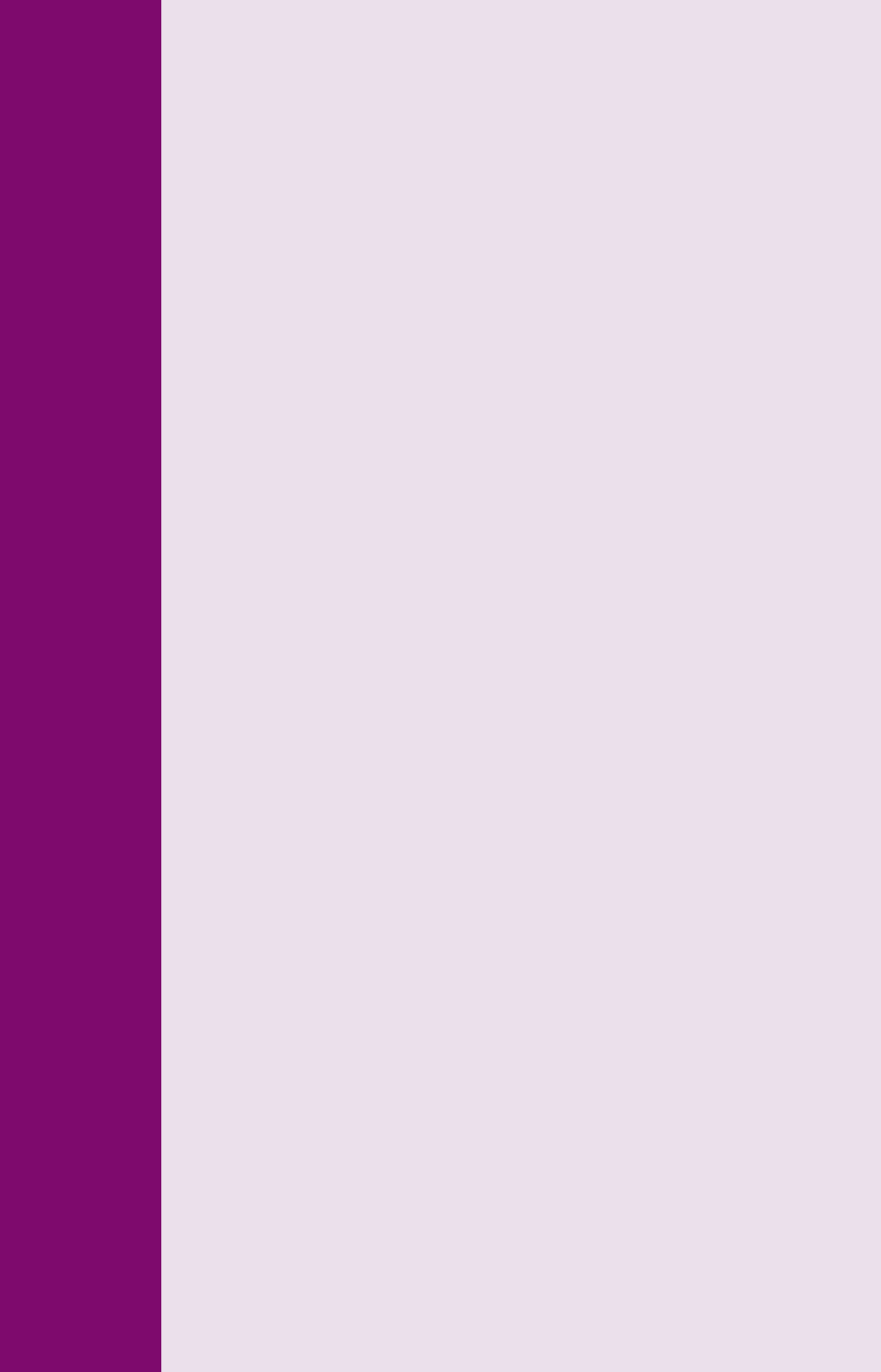
What You Need  
To Know About™

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# Thyroid Cancer

**U.S. DEPARTMENT OF  
HEALTH AND HUMAN SERVICES**

**National Institutes of Health**



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## About This Booklet

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This National Cancer Institute (NCI) booklet is about *cancer*\* that begins in the *thyroid*. Each year in the United States, more than 25,000 women and 8,000 men learn they have thyroid cancer.

This booklet tells about diagnosis, staging, treatment, and follow-up care. Learning about the medical care for thyroid cancer can help you take an active part in making choices about your own care.

This booklet has lists of questions that you may want to ask your doctor. Many people find it helpful to take a list of questions to a doctor visit. To help remember what your doctor says, you can take notes or ask whether you may use a tape recorder. You may also want to have a family member or friend with you when you talk with the doctor—to take part in the discussion, to take notes, or just to listen.

For the latest information about thyroid cancer, please visit our Web site at **<http://www.cancer.gov/cancertopics/types/thyroid>**. Or, contact our Cancer Information Service. We can answer your questions about cancer. We can send you NCI booklets and fact sheets. Call **1-800-4-CANCER (1-800-422-6237)** or instant message us through the **LiveHelp** service at **<http://www.cancer.gov/help>**.

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\*Words in *italics* are in the Dictionary on page 30. The Dictionary explains these terms. It also shows how to pronounce them.

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## The Thyroid

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Your thyroid is a *gland* at the front of your neck beneath your voice box (*larynx*). A healthy thyroid is a little larger than a quarter. It usually cannot be felt through the skin.

The thyroid has two parts (lobes). A thin piece of tissue (the *isthmus*) separates the lobes.

The thyroid makes *hormones*:

- **Thyroid hormone:** Thyroid hormone is made by *thyroid follicular cells*. It affects heart rate, blood pressure, body temperature, and weight.
- **Calcitonin:** Calcitonin is made by *C cells* in the thyroid. It plays a small role in keeping a healthy level of *calcium* in the body.

Four or more tiny *parathyroid glands* are behind the thyroid. They are on its surface. They make parathyroid hormone, which plays a big role in helping the body maintain a healthy level of calcium.

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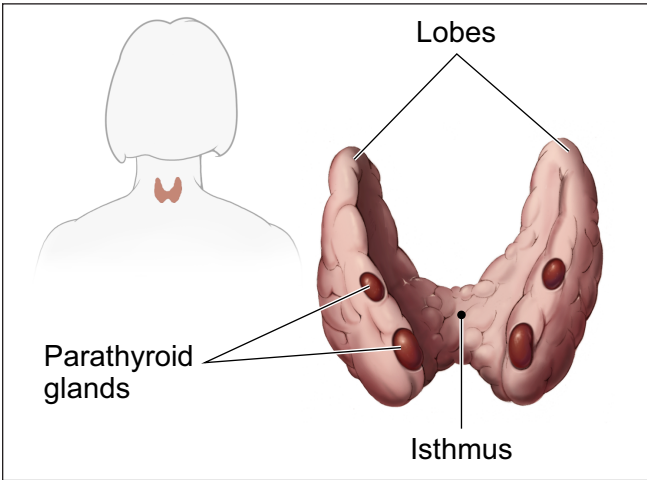
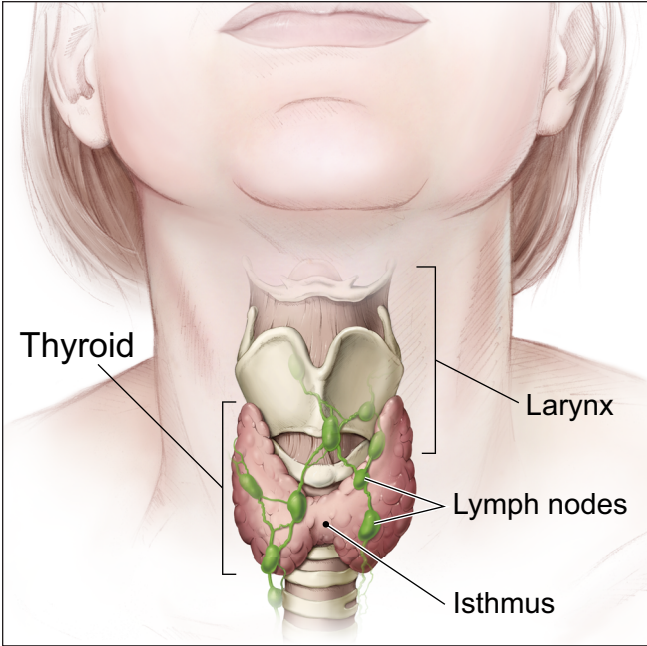
## Cancer Cells

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Cancer begins in cells, the building blocks that make up tissues. Tissues make up the organs of the body.

Normal, healthy cells grow and divide to form new cells as the body needs them. When normal cells grow old or get damaged, they die, and new cells take their place.

Sometimes, this orderly process goes wrong. New cells form when the body does not need them, and old or damaged cells do not die as they should. The build-up of extra cells often forms a mass of tissue called a growth or *tumor*.



The pictures show the front and back of the thyroid.

Growths on the thyroid are often called *nodules*. Most thyroid nodules (more than 90 percent) are *benign* (not cancer). Benign nodules are not as harmful as *malignant* nodules (cancer):

- **Benign nodules**

- are rarely a threat to life
- don't invade the tissues around them
- don't spread to other parts of the body
- usually don't need to be removed

- **Malignant nodules**

- may sometimes be a threat to life
- can invade nearby tissues and organs
- can spread to other parts of the body
- often can be removed or destroyed, but sometimes the cancer returns

Cancer cells can spread by breaking away from the original tumor. They enter blood vessels or *lymph vessels*, which branch into all the tissues of the body. The cancer cells attach to other organs and grow to form new tumors that may damage those organs. The spread of cancer is called *metastasis*.

See the Staging section on page 11 for information about thyroid cancer that has spread.

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## Types of Thyroid Cancer

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There are several types of thyroid cancer:

- ***Papillary thyroid cancer***: In the United States, this type makes up about 80 percent of all thyroid cancers. It begins in follicular cells and grows slowly. If diagnosed early, most people with papillary thyroid cancer can be cured.
- ***Follicular thyroid cancer***: This type makes up about 15 percent of all thyroid cancers. It begins in follicular cells and grows slowly. If diagnosed early, most people with follicular thyroid cancer can be treated successfully.
- ***Medullary thyroid cancer***: This type makes up about 3 percent of all thyroid cancers. It begins in the C cells of the thyroid. Cancer that starts in the C cells can make abnormally high levels of calcitonin. Medullary thyroid cancer tends to grow slowly. It can be easier to control if it's found and treated before it spreads to other parts of the body.
- ***Anaplastic thyroid cancer***: This type makes up about 2 percent of all thyroid cancers. It begins in the follicular cells of the thyroid. The cancer cells tend to grow and spread very quickly. Anaplastic thyroid cancer is very hard to control.



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## Risk Factors

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Doctors often cannot explain why one person develops thyroid cancer and another does not. However, it is clear that no one can catch thyroid cancer from another person.

Research has shown that people with certain risk factors are more likely than others to develop thyroid cancer. A risk factor is something that may increase the chance of developing a disease.

Studies have found the following risk factors for thyroid cancer:

- ***Radiation:*** People exposed to high levels of radiation are much more likely than others to develop papillary or follicular thyroid cancer. One important source of radiation exposure is treatment with *x-rays*. Between the 1920s and the 1950s, doctors used high-dose *x-rays* to treat children who had enlarged tonsils, acne, and other problems affecting the head and neck. Later, scientists found that some people who had received this kind of treatment developed thyroid cancer.

(Routine diagnostic *x-rays*—such as dental *x-rays* or chest *x-rays*—use very low doses of radiation. Their benefits usually outweigh their risks. However, repeated exposure could be harmful, so it's a good idea to talk with your dentist and doctor about the need for each *x-ray* and to ask about the use of shields to protect other parts of the body.)

Another source of radiation is *radioactive fallout*. This includes fallout from atomic weapons testing (such as the testing in the United States and elsewhere in the world, mainly in the 1950s and 1960s), nuclear power plant accidents (such as the Chernobyl [also called Chernobyl] accident in

1986), and releases from atomic weapons production plants (such as the Hanford facility in Washington state in the late 1940s). Such radioactive fallout contains *radioactive iodine* (I-131) and other radioactive elements. People who were exposed to one or more sources of I-131, especially if they were children at the time of their exposure, may have an increased risk of thyroid diseases. For example, children exposed to radioactive iodine from the Chornobyl accident have an increased risk of thyroid cancer.

For more information, you may want to read the NCI fact sheet *I-131 and Radioactive Fallout: Questions and Answers*. Page 40 tells how to get NCI fact sheets.

- **Family history of medullary thyroid cancer:** Medullary thyroid cancer sometimes runs in families. A change in a *gene* called RET can be passed from parent to child. Nearly everyone with the changed RET gene develops medullary thyroid cancer. The disease occurs alone as *familial medullary thyroid cancer* or with other cancers as *multiple endocrine neoplasia (MEN) syndrome*.  
A blood test can detect the changed RET gene. If it's found in a person with medullary thyroid cancer, the doctor may suggest that family members be tested. For those who have the changed gene, the doctor may recommend frequent lab tests or *surgery* to remove the thyroid before cancer develops.
- **Family history of goiters or colon growths:** A small number of people with a family history of having goiters (swollen thyroids) with multiple thyroid nodules are at risk for developing papillary thyroid cancer. Also, a small number of people with a family history of having multiple growths on the inside of the colon or rectum (*familial polyposis*) are at risk for developing papillary thyroid cancer.

- **Personal history:** People with a goiter or benign thyroid nodules have an increased risk of thyroid cancer.
- **Being female:** In the United States, women are almost three times more likely than men to develop thyroid cancer.
- **Age over 45:** Most people with thyroid cancer are more than 45 years old. Most people with anaplastic thyroid cancer are more than 60 years old.
- **Iodine:** Iodine is a substance found in shellfish and iodized salt. Scientists are studying iodine as a possible risk factor for thyroid cancer. Too little iodine in the diet may increase the risk of follicular thyroid cancer. However, other studies show that too much iodine in the diet may increase the risk of papillary thyroid cancer. More studies are needed to know whether iodine is a risk factor.

Having one or more risk factors does not mean that a person will get thyroid cancer. Most people who have risk factors never develop cancer.

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## Symptoms

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Early thyroid cancer often does not have symptoms. But as the cancer grows, symptoms may include:

- A lump in the front of the neck
- Hoarseness or voice changes
- Swollen *lymph nodes* in the neck
- Trouble swallowing or breathing
- Pain in the throat or neck that does not go away

Most often, these symptoms are not due to cancer. An infection, a benign goiter, or another health problem is usually the cause of these symptoms. Anyone with symptoms that do not go away in a

couple of weeks should see a doctor to be diagnosed and treated as early as possible.

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## Diagnosis

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If you have symptoms that suggest thyroid cancer, your doctor will help you find out whether they are from cancer or some other cause. Your doctor will ask you about your personal and family medical history. You may have one or more of the following tests:

- **Physical exam:** Your doctor feels your thyroid for lumps (nodules). Your doctor also checks your neck and nearby lymph nodes for growths or swelling.
- **Blood tests:** Your doctor may check for abnormal levels of *thyroid-stimulating hormone* (TSH) in the blood. Too much or too little TSH means the thyroid is not working well. If your doctor thinks you may have medullary thyroid cancer, you may be checked for a high level of calcitonin and have other blood tests.
- **Ultrasound:** An ultrasound device uses sound waves that people cannot hear. The device aims sound waves at the thyroid, and a computer creates a picture of the waves that bounce off the thyroid. The picture can show thyroid nodules that are too small to be felt. The doctor uses the picture to learn the size and shape of each nodule and whether the nodules are solid or filled with fluid. Nodules that are filled with fluid are usually not cancer. Nodules that are solid may be cancer.
- **Thyroid scan:** Your doctor may order a scan of your thyroid. You swallow a small amount of a radioactive substance, and it travels through the bloodstream. Thyroid cells that absorb the radioactive substance can be seen on a scan. Nodules that take up more of the substance than the

thyroid tissue around them are called “hot” nodules. Hot nodules are usually not cancer. Nodules that take up less substance than the thyroid tissue around them are called “cold” nodules. Cold nodules may be cancer.



- **Biopsy:** A biopsy is the only sure way to diagnose thyroid cancer. A *pathologist* checks a sample of tissue for cancer cells with a microscope.  
Your doctor may take tissue for a biopsy in one of two ways:
  - **Fine-needle aspiration:** Most people have this type of biopsy. Your doctor removes a sample of tissue from a thyroid nodule with a thin needle. An ultrasound device can help your doctor see where to place the needle.

— **Surgical biopsy:** If a diagnosis cannot be made from fine-needle aspiration, a *surgeon* removes the whole nodule during an operation. If the doctor suspects follicular thyroid cancer, surgical biopsy may be needed for diagnosis.

You may want to ask your doctor these questions before having a biopsy:

- Will I have to go to the hospital for the biopsy?
- How long will it take?
- Will I be awake? Will it hurt?
- Are there any risks? What are the chances of infection or bleeding after the biopsy?
- How long will it take me to recover?
- Will I have a scar on my neck?
- How soon will I know the results? Who will explain the results to me?
- If I do have cancer, who will talk to me about the next steps? When?

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## Staging

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To plan the best treatment, your doctor needs to learn the extent (stage) of the disease. Staging is a careful attempt to find out the size of the nodule, whether the cancer has spread, and if so, to what parts of the body.

Thyroid cancer spreads most often to the lymph nodes, lungs, and bones. When cancer spreads from its original place to another part of the body, the new tumor has the same kind of cancer cells and the same name as the original cancer. For example, if thyroid cancer spreads to the lungs, the cancer cells in the lungs are actually thyroid cancer cells. The disease is *metastatic* thyroid cancer, not lung cancer. For that reason, it's treated as thyroid cancer, not lung cancer. Doctors call the new tumor "distant" or metastatic disease.

Staging may involve one or more of these tests:

- **Ultrasound:** An ultrasound exam of your neck may show whether cancer has spread to lymph nodes or other tissues near your thyroid.
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of areas inside your body. A CT scan may show whether cancer has spread to lymph nodes, other areas in your neck, or your chest.
- **MRI:** MRI uses a powerful magnet linked to a computer. It makes detailed pictures of tissue. Your doctor can view these pictures on a screen or print them on film. MRI may show whether cancer has spread to lymph nodes or other areas.
- **Chest x-ray:** X-rays of your chest may show whether cancer has spread to the lungs.
- **Whole body scan:** You may have a whole body scan to see if cancer has spread from the thyroid to other parts of the body. You get a small amount of a radioactive substance. The substance travels through the bloodstream. Thyroid cancer cells in other organs or the bones take up the substance. Thyroid cancer that has spread may show up on a whole body scan.

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## Treatment

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People with thyroid cancer have many treatment options. Treatment usually begins within a few weeks after the diagnosis, but you will have time to talk with your doctor about treatment choices and get a second opinion.

The choice of treatment depends on:

- the type of thyroid cancer (papillary, follicular, medullary, or anaplastic)
- the size of the nodule
- your age
- whether the cancer has spread

You and your doctor can work together to develop a treatment plan that meets your needs.

Your doctor may refer you to a specialist who has experience treating thyroid cancer, or you may ask for a referral. An *endocrinologist* is a doctor who specializes in treating people who have hormone disorders. You may see a *thyroidologist*, an endocrinologist who specializes in treating diseases of the thyroid.

You may have a team of specialists. Other specialists who treat thyroid cancer include *surgeons*, *medical oncologists*, and *radiation oncologists*. Your health care team may also include an *oncology nurse* and a *registered dietitian*.

Your doctor can describe your treatment choices and the expected results. Thyroid cancer may be treated with *surgery*, *thyroid hormone treatment*, *radioactive iodine therapy*, *external radiation therapy*, or *chemotherapy*. Most patients receive a combination of



treatments. For example, the standard treatment for papillary cancer is surgery, thyroid hormone treatment, and radioactive iodine therapy. Although external radiation therapy and chemotherapy are not often used, when they are, the treatments may be combined.

Surgery and external radiation therapy are *local therapies*. They remove or destroy cancer in the thyroid. When thyroid cancer has spread to other parts of the body, local therapy may be used to control the disease in those specific areas.

Thyroid hormone treatment, radioactive iodine therapy, and chemotherapy are *systemic therapies*. Systemic therapies enter the bloodstream and destroy or control cancer throughout the body.

You may want to know about side effects and how treatment may change your normal activities. Because cancer treatments often damage healthy cells and tissues, side effects are common. Side effects depend mainly on the type and extent of the treatment. Side effects may not be the same for each person, and they may change from one treatment session to the next. Before treatment starts, ask your health care team to explain possible side effects and suggest ways to help you manage them.

At any stage of disease, care is available to relieve the side effects of treatment, to control pain and other symptoms, and to help you cope with the feelings that a diagnosis of cancer can bring. Information about coping is available on NCI's Web site at <http://www.cancer.gov/cancertopics/coping>, and from Information Specialists at **1-800-4-CANCER** or **LiveHelp** (<http://www.cancer.gov/help>).

You may want to talk to your doctor about taking part in a *clinical trial*, a research study of new treatment methods. See The Promise of Cancer Research section on page 28.

You may want to ask your doctor these questions before your treatment begins:

- What type of thyroid cancer do I have? May I have a copy of the report from the pathologist?
- What is the stage of my disease? Has the cancer spread from the thyroid? If so, to where?
- What are my treatment choices? Which do you recommend for me? Why?
- Will I have more than one kind of treatment?
- What are the expected benefits of each kind of treatment?
- What are the risks and possible side effects of each treatment? What can we do to control the side effects?
- What can I do to prepare for treatment?
- Will I need to stay in the hospital? If so, for how long?
- What is the treatment likely to cost? Will my insurance cover the cost?
- How will treatment affect my normal activities?
- What is my chance of a full recovery?
- Would a clinical trial be appropriate for me? Can you help me find one?
- How often will I need checkups?

## Surgery

Most people with thyroid cancer have surgery. The surgeon removes all or part of the thyroid. The type of surgery depends on the type and stage of thyroid cancer, the size of the nodule, and your age.

- **Total thyroidectomy:** This surgery can be used for all types of thyroid cancer. The surgeon removes all of the thyroid through an *incision* in the neck. If the surgeon is not able to remove all of the thyroid tissue, it can be destroyed by radioactive iodine therapy later.

Nearby lymph nodes also may be removed. If cancer has invaded tissue within the neck, the surgeon may remove nearby tissue. If cancer has spread outside the neck, surgery, radioactive iodine therapy, or external radiation therapy may be used to treat those areas.

- **Lobectomy:** Some people with follicular or papillary thyroid cancer may have only part of the thyroid removed. The surgeon removes one lobe and the isthmus. Some people who have a lobectomy later have a second surgery to remove the rest of the thyroid. Less often, the remaining thyroid tissue is destroyed by radioactive iodine therapy.

The time it takes to heal after surgery is different for each person. You may be uncomfortable for the first few days. Medicine can help control your pain. Before surgery, you should discuss the plan for pain relief with your doctor or nurse. After surgery, your doctor can adjust the plan if you need more pain relief.

Surgery for thyroid cancer removes the cells that make thyroid hormone. After surgery, nearly all people need to take pills to replace the natural thyroid hormone. You will need thyroid hormone pills for the rest of your life.

If the surgeon removes the parathyroid glands, you may need to take calcium and vitamin D pills for the rest of your life.

In a few people, surgery may damage certain nerves or muscles. If this happens, a person may have voice problems or one shoulder may be lower than the other.

You may want to ask your doctor these questions before having surgery:

- Which type of surgery do you suggest for me?
- Do I need any lymph nodes removed? Will the parathyroid glands or other tissues be removed? Why?
- What are the risks of surgery?
- How will I feel after surgery? If I have pain, how will it be controlled?
- How long will I be in the hospital?
- What will my scar look like?
- Will I have any lasting side effects?
- Will I need to take thyroid hormone pills? If so, how soon will I start taking them? Will I need to take them for the rest of my life?
- When can I get back to my normal activities?

## **Thyroid Hormone Treatment**

After surgery to remove part or all of the thyroid, nearly everyone needs to take pills to replace the natural thyroid hormone. However, thyroid hormone pills are also used as part of the treatment for papillary or follicular thyroid cancer. Thyroid hormone slows the growth of thyroid cancer cells left in the body after surgery.

Thyroid hormone pills seldom cause side effects. Your doctor gives you blood tests to make sure you're getting the right dose of thyroid hormone. Too much thyroid hormone may cause you to lose weight and feel hot and sweaty. It may also cause a fast heart rate, chest pain, cramps, and diarrhea. Too little thyroid hormone may cause you to gain weight, feel cold and tired, and have dry skin and hair. If you have side effects, your doctor can adjust your dose of thyroid hormone.

You may want to ask your doctor these questions before taking thyroid hormone:

- Why do I need this treatment?
- What will it do?
- How long will I be on this treatment?

## **Radioactive Iodine Therapy**

Radioactive iodine (I-131) therapy is a treatment for papillary or follicular thyroid cancer. It kills thyroid cancer cells and normal thyroid cells that remain in the body after surgery.

People with medullary thyroid cancer or anaplastic thyroid cancer usually do not receive I-131 therapy. These types of thyroid cancer rarely respond to I-131 therapy.

Even people who are allergic to iodine can take I-131 therapy safely. The therapy is given as a liquid or capsule that you swallow. I-131 goes into the bloodstream and travels to thyroid cancer cells throughout the body. When thyroid cancer cells take in enough I-131, they die.

Many people get I-131 therapy in a clinic or in the outpatient area of a hospital and can go home

afterward. Some people have to stay in the hospital for one day or longer. Ask your health care team to explain how to protect family members and coworkers from being exposed to the radiation.

Most radiation from I-131 is gone in about one week. Within three weeks, only traces of I-131 remain in the body.

During treatment, you can help protect your bladder and other healthy tissues by drinking a lot of fluids. Drinking fluids helps I-131 pass out of the body faster.

Some people have mild nausea the first day of I-131 therapy. A few people have swelling and pain in the neck where thyroid cells remain. If thyroid cancer cells have spread outside the neck, those areas may be painful too.

You may have a dry mouth or lose your sense of taste or smell for a short time after I-131 therapy. Chewing sugar-free gum or sucking on sugar-free hard candy may help.

A rare side effect in men who receive a high dose of I-131 is loss of *fertility*. In women, I-131 may not cause loss of fertility, but some doctors advise women to avoid getting pregnant for one year after a high dose of I-131.

Researchers have reported that a very small number of patients may develop a second cancer years after treatment with a high dose of I-131. See the Follow-up Care section on page 24 for information about checkups after treatment.

A high dose of I-131 also kills normal thyroid cells, which make thyroid hormone. After radioactive iodine therapy, you need to take thyroid hormone pills to replace the natural hormone.

You may wish to read the NCI fact sheet *Radiation Therapy for Cancer: Questions and Answers*. Page 40 tells how to get NCI fact sheets.

You may want to ask your doctor these questions before having radioactive iodine therapy:

- Why do I need this treatment?
- What will it do?
- How do I prepare for this treatment? Do I need to avoid foods and medicines that have iodine in them? For how long?
- Will I need to stay in the hospital for this treatment? If so, for how long?
- How do I protect my family members and others from the radiation? For how many days?
- Will the I-131 therapy cause side effects? What can I do about them?
- What is the chance that I will be given I-131 therapy again in the future?

## **External Radiation Therapy**

External radiation therapy (also called radiotherapy) is a treatment for any type of thyroid cancer that can't be treated with surgery or I-131 therapy. It's also used for cancer that returns after treatment or to treat bone pain from cancer that has spread.

External radiation therapy uses high-energy rays to kill cancer cells. A large machine directs radiation at the neck or other tissues where cancer has spread.

Most patients go to the hospital or clinic for their treatment, usually 5 days a week for several weeks. Each treatment takes only a few minutes.

The side effects depend mainly on how much radiation is given and which part of your body is treated. Radiation to the neck may cause a dry, sore mouth and throat, hoarseness, or trouble swallowing. Your skin in the treated area may become red, dry, and tender.

You are likely to become tired during radiation therapy, especially in the later weeks of treatment. Resting is important, but doctors usually advise patients to try to stay as active as they can.

Although the side effects of radiation therapy can be distressing, your doctor can usually treat or control them. The side effects usually go away after treatment ends.

You may wish to read the NCI booklet *Radiation Therapy and You*. Page 40 tells how to get NCI booklets.

You may want to ask your doctor these questions about external radiation therapy:

- Why do I need this treatment?
- When will the treatments begin? How often will I have them? When will they end?
- How will I feel during treatment?
- How will we know if the radiation treatment is working?
- What can I do to take care of myself during treatment?
- Can I continue my normal activities?
- Are there any lasting side effects?



## Chemotherapy

Chemotherapy is a treatment for anaplastic thyroid cancer. It's sometimes used to relieve symptoms of medullary thyroid cancer or other thyroid cancers.

Chemotherapy uses drugs to kill cancer cells. The drugs are usually given by injection into a vein. They enter the bloodstream and can affect cancer cells all over the body.

You may have treatment in a clinic, at the doctor's office, or at home. Some people may need to stay in the hospital during treatment.

The side effects of chemotherapy depend mainly on which drugs and how much are given. The drugs can harm normal cells that divide rapidly, such as the cells in the mouth. The most common side effects include nausea, vomiting, mouth sores, loss of appetite, and hair loss. Your health care team can suggest ways to control many of these side effects. Most side effects go away after treatment ends.

You may wish to read the NCI booklet *Chemotherapy and You*. Page 40 tells how to get NCI booklets.

You may want to ask your doctor these questions about chemotherapy:

- Why do I need this treatment?
- What will it do?
- Will I have side effects? What can I do about them?
- How long will I be on this treatment?

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## Second Opinion

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Before starting treatment, you might want a second opinion about your diagnosis and treatment plan. Many insurance companies cover a second opinion if you or your doctor requests it. A second opinion can make you feel more confident about the diagnosis and treatment choices.

It may take some time and effort to gather your medical records and see another doctor. In most cases, it's not a problem to take several weeks to get a second opinion. The delay in starting treatment usually will not make treatment less effective. To make sure, you should discuss any delay with your doctor.



There are many ways to find a doctor for a second opinion. You can ask your doctor, a local or state medical society, a nearby hospital, or a medical school for names of specialists. Other sources can be found in NCI's fact sheet *How To Find a Doctor or Treatment Facility If You Have Cancer*. Page 40 tells how to get NCI fact sheets.

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## Follow-up Care

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You need regular checkups after treatment for thyroid cancer. Even when there are no longer any signs of cancer, the disease sometimes returns because cancer cells remained somewhere in the body after treatment.

Your doctor monitors your recovery and checks for return of the cancer with blood tests and imaging tests. If thyroid cancer returns, it is most commonly found in the neck, lungs, or bones.

Also, checkups help detect health problems that can result from cancer treatment. People treated with radioactive iodine therapy or external radiation therapy have an increased chance of developing other cancers later on. If you have any health problems between checkups, you should contact your doctor.

People treated for papillary or follicular thyroid cancer have blood tests to check the levels of TSH and *thyroglobulin*. Thyroid hormone is normally stored in the thyroid as thyroglobulin. If the whole thyroid has been removed, there should be very little or no thyroglobulin in the blood. A high level of thyroglobulin may mean that thyroid cancer has

returned. Your doctor helps you get ready for a thyroglobulin test in one of two ways:

- **You stop taking your thyroid hormone pills for a short time:** About six weeks before the thyroglobulin test, your doctor may change the type of thyroid hormone pill you take. About two weeks before the test, you stop taking any type of thyroid hormone pill. This can cause uncomfortable side effects. You may gain weight and feel very tired. It may be helpful to talk with your doctor or nurse about ways to cope with such problems. After the thyroglobulin test, you can take your usual thyroid hormone pill again.
- **You get a shot of TSH:** Your doctor may give you a shot of TSH. If any cancer cells remain in the body after treatment, TSH causes them to release thyroglobulin. The lab checks the level of thyroglobulin in the blood. People who get this shot don't have to stop taking their thyroid hormone pill.  
People treated for medullary thyroid cancer have blood tests to check the level of calcitonin and other substances.

In addition to blood tests, checkups may include one or more of the following imaging tests:

- **Ultrasound:** An ultrasound exam of the neck may show whether cancer has returned there.
- **Whole body scan:** To get ready for the whole body scan, you either stop taking your thyroid hormone pill for several weeks or you get a shot of TSH (as described above for the thyroglobulin test). Most people need to avoid eating shellfish and iodized salt for a week or two before the scan. Your doctor gives you a very small dose of radioactive iodine or another radioactive substance. The radioactive substance is taken up by cancer cells (if any cancer cells are present). Cancer cells show up on the scan.

- **PET scan:** Your doctor uses a PET scan to find cancer that has returned. You receive an injection of a small amount of radioactive sugar. A machine makes computerized pictures of the sugar being used by cells in the body. Cancer cells use sugar faster than normal cells, and areas with cancer look brighter on the pictures.
- **CT scan:** A CT scan may show whether cancer has returned.
- **MRI:** MRI may show whether cancer has returned.

You may want to read the NCI booklet *Facing Forward Series: Life After Cancer Treatment*. It answers questions about follow-up care and other concerns. Page 40 tells how to get NCI booklets.

You may want to ask your doctor these questions after you have finished treatment:

- How often will I need checkups?
- Which follow-up tests do you suggest for me?  
Do I need to avoid iodized salt and other sources of iodine before any of these tests?
- Between checkups, what health problems or symptoms should I tell you about?

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## Sources of Support

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Learning that you have a serious disease such as thyroid cancer is not easy. You may worry about caring for your family, keeping your job, or continuing daily activities. Concerns about treatments and managing side effects, hospital stays, and medical bills are also common.

It may help to share your feelings with family, friends, a member of your health care team, or another person with cancer. Here's where you can go for support:

- Doctors, nurses, and other members of your health care team can answer questions about treatment, working, or other activities.
- Social workers, counselors, or members of the clergy can be helpful if you want to talk about your feelings or concerns. Often, social workers can suggest resources for financial aid, transportation, home care, or emotional support.



- Support groups can also help. In these groups, patients or their family members meet with other patients or their families to share what they have learned about coping with the disease and the effects of treatment. Groups may offer support in person, over the telephone, or on the Internet. You may want to talk with a member of your health care team about finding a support group.
- Information specialists at **1-800-4-CANCER** and at **LiveHelp** (<http://www.cancer.gov/help>) can help you locate programs, services, and publications. They can send you a list of organizations that offer services to people with cancer.

For tips on coping, you may want to read the NCI booklet *Taking Time: Support for People With Cancer*. Page 40 tells how to get NCI booklets.

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## The Promise of Cancer Research

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Doctors all over the country are conducting many types of clinical trials (research studies in which people volunteer to take part). Clinical trials are designed to answer important questions and to find out whether new approaches are safe and effective. Research already has led to advances in the diagnosis and treatment of thyroid cancer. Researchers continue to search for new and better ways to treat thyroid cancer.

People who join clinical trials may be among the first to benefit if a new approach is effective. And even if the people in a trial do not benefit directly, they may still make an important contribution by helping doctors learn more about thyroid cancer and how to control it. Although clinical trials may pose some risks, researchers do all they can to protect their patients.

NCI's Web site includes a section on clinical trials at <http://www.cancer.gov/clinicaltrials>. It has general information about clinical trials as well as detailed information about specific ongoing studies of thyroid cancer. NCI's Information Specialists at **1-800-4-CANCER** or at **LiveHelp** at <http://www.cancer.gov/help> can answer questions and provide information about clinical trials.

If you're interested in taking part in a clinical trial, talk with your doctor. You may also want to read the NCI booklet *Taking Part in Cancer Treatment Research Studies*. This booklet describes how treatment studies are carried out and explains their possible benefits and risks. Page 40 tells how to get NCI booklets.

Another agency of the Federal Government, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), conducts research on diseases of the thyroid. NIDDK performs laboratory studies and conducts clinical trials on thyroid cancer. The Web site address of the NIDDK is <http://www.niddk.nih.gov>.

You can find NCI and NIDDK clinical trials described at <http://www.clinicaltrials.gov>. This Web site provides the latest information about federally and privately supported clinical trials.



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## Dictionary

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A dictionary with thousands of terms is on the NCI Web site at <http://www.cancer.gov/dictionary>.

**Anaplastic thyroid cancer** (A-nuh-PLAS-tik THY-royd KAN-ser): A rare, aggressive type of thyroid cancer in which the malignant (cancer) cells look very different from normal thyroid cells.

**Benign** (beh-NINE): Not cancerous. Benign tumors may grow larger but do not spread to other parts of the body.

**Biopsy** (BY-op-see): The removal of cells or tissues for examination by a pathologist. The pathologist may study the tissue under a microscope or perform other tests on the cells or tissue. When only a sample of tissue is removed, the procedure is called an incisional biopsy. When an entire lump or suspicious area is removed, the procedure is called an excisional biopsy. When a sample of tissue or fluid is removed with a needle, the procedure is called a needle biopsy, core biopsy, or fine-needle aspiration.

**C cell**: A type of cell in the thyroid. C cells make calcitonin, a hormone that helps control the calcium level in the blood.

**Calcitonin** (KAL-sih-TOH-nin): A hormone formed by the C cells of the thyroid gland. It helps maintain a healthy level of calcium in the blood. When the calcium level is too high, calcitonin lowers it.

**Calcium** (KAL-see-um): A mineral found in teeth, bones, and other body tissues.

**Cancer** (KAN-ser): A term for diseases in which abnormal cells divide without control. Cancer cells can invade nearby tissues and can spread to other parts of the body through the blood and lymph systems.

**Chemotherapy** (KEE-moh-THAYR-uh-pee): Treatment with drugs that kill cancer cells.

**Clinical trial:** A type of research study that tests how well new medical approaches work in people. These studies test new methods of screening, prevention, diagnosis, or treatment of a disease. Also called a clinical study.

**CT scan:** Computed tomography scan (kum-PYOO-ted tuh-MAH-gruh-fee skan). A series of detailed pictures of areas inside the body taken from different angles; the pictures are created by a computer linked to an x-ray machine. Also called computerized tomography and computerized axial tomography (CAT) scan.

**Endocrinologist** (en-duh-krih-NAH-loh-jist): A doctor who specializes in diagnosing and treating hormone disorders.

**External radiation therapy** (RAY-dee-AY-shun): Radiation therapy that uses a machine to aim high-energy rays at the cancer. Also called external-beam radiation.

**Familial medullary thyroid cancer** (fuh-MIH-lee-ul MED-yoo-LAYR-ee): An inherited form of medullary thyroid cancer (cancer that forms in the cells of the thyroid that make the hormone calcitonin).

**Familial polyposis** (fuh-MIH-lee-ul PAH-lee-POH-sis): An inherited condition in which numerous polyps (growths that protrude from mucous membranes) form on the inside walls of the colon and rectum. It increases the risk of colorectal cancer. Also called familial adenomatous polyposis and FAP.

**Fertility** (fer-TIL-i-tee): The ability to produce children.

**Fine-needle aspiration** (as-per-AY-shun): The removal of tissue or fluid with a needle for examination under a microscope. Also called needle biopsy.

***Follicular thyroid cancer*** (fuh-LIH-kyoo-ler THY-royd KAN-ser): Cancer that develops from cells in the follicular areas of the thyroid. One of the slow-growing, highly treatable types of thyroid cancer.

***Gene***: The functional and physical unit of heredity passed from parent to offspring. Genes are pieces of DNA, and most genes contain the information for making a specific protein.

***Gland***: An organ that makes one or more substances, such as hormones, digestive juices, sweat, tears, saliva, or milk.

***Goiter*** (GOY-ter): An enlarged thyroid. It may be caused by too little iodine in the diet or by other conditions. Most goiters are not cancer.

***Hormone***: A chemical made by glands in the body. Hormones circulate in the bloodstream and control the actions of certain cells or organs. Some hormones can also be made in a laboratory.

***Hyperthyroidism*** (HY-per-THY-ROY-dih-zum): Too much thyroid hormone. Symptoms include weight loss, chest pain, cramps, diarrhea, and nervousness. Also called overactive thyroid.

***Hypothyroidism*** (HY-poh-THY-ROY-dih-zum): Too little thyroid hormone. Symptoms include weight gain, constipation, dry skin, and sensitivity to the cold. Also called underactive thyroid.

***Incision*** (in-SIH-zhun): A cut made in the body to perform surgery.

***Iodine*** (I-oh-dine): An element that is necessary for the body to make thyroid hormone. It is found in shellfish and iodized salt.

***Isthmus*** (iz-muhs): A narrow part inside the body that connects two larger structures.

**Larynx** (LAYR-inks): The area of the throat containing the vocal cords and used for breathing, swallowing, and talking. Also called the voice box.

**Lobectomy** (loh-BEK-toh-mee): Surgery to remove a whole lobe (section) of an organ (such as a lung, liver, brain, or thyroid gland).

**Local therapy** (THAYR-uh-pee): Treatment that affects cells in the tumor and the area close to it.

**Lymph node** (limf): A rounded mass of lymphatic tissue that is surrounded by a capsule of connective tissue. Lymph nodes filter lymph (lymphatic fluid), and they store lymphocytes (white blood cells). They are located along lymphatic vessels. Also called a lymph gland.

**Lymph vessel** (limf): A thin tube that carries lymph (lymphatic fluid) and white blood cells through the lymphatic system. Also called lymphatic vessel.

**Malignant** (muh-LIG-nunt): Cancerous. Malignant tumors can invade and destroy nearby tissue and spread to other parts of the body.

**Medical oncologist** (MEH-dih-kul on-KAH-loh-jist): A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, and biological therapy. A medical oncologist often is the main health care provider for someone who has cancer. A medical oncologist also gives supportive care and may coordinate treatment given by other specialists.

**Medullary thyroid cancer** (MED-yoo-LAYR-ee THY-royd KAN-ser): Cancer that develops in C cells of the thyroid. The C cells make a hormone (calcitonin) that helps maintain a healthy level of calcium in the blood.

**Metastasis** (meh-TAS-tuh-sis): The spread of cancer from one part of the body to another. A tumor formed by cells that have spread is called a “metastatic tumor”

or a “metastasis.” The metastatic tumor contains cells that are like those in the original (primary) tumor. The plural form of metastasis is metastases (meh-TAS-tuh-SEEZ).

***Metastatic*** (meh-tuh-STA-tik): Having to do with metastasis, which is the spread of cancer from one part of the body to another.

***MRI***: Magnetic resonance imaging (mag-NEH-tik REH-zuh-nunts IH-muh-jing). A procedure in which radio waves and a powerful magnet linked to a computer are used to create detailed pictures of areas inside the body. These pictures can show the difference between normal and diseased tissue. MRI makes better images of organs and soft tissue than other scanning techniques, such as computed tomography (CT) or x-ray. Also called nuclear magnetic resonance imaging (NMRI).

***Multiple endocrine neoplasia syndrome*** (MUL-tih-pul EN-doh-krin NEE-oh-PLAY-zuh SIN-drome): MEN. An inherited condition that may result in the development of cancers of the endocrine system (hormone-releasing tissues, such as the thyroid and pancreas). There are several types of multiple endocrine neoplasia syndrome, and patients with each type may develop different types of cancer. The altered genes that cause each type can be detected with a blood test. Also called MEN syndrome.

***Nodule*** (NOD-yool): A growth or lump that may be cancerous or noncancerous.

***Oncology nurse*** (on-KAH-loh-jee): A nurse who specializes in treating and caring for people who have cancer.

***Papillary thyroid cancer*** (PA-pih-LAYR-ee THY-royd KAN-ser): Cancer that forms in follicular cells in the thyroid and grows in small finger-like shapes. It grows slowly, is more common in women than in men, and

often occurs before age 45. It is the most common type of thyroid cancer.

**Parathyroid gland** (PAYR-uh-THY-royd): One of four pea-sized glands found on the surface of the thyroid. The parathyroid hormone made by these glands increases the calcium level in the blood.

**Pathologist** (puh-THAH-loh-jist): A doctor who identifies diseases by studying cells and tissues under a microscope.

**PET scan**: Positron emission tomography scan (PAH-zih-tron ee-MIH-shun toh-MAH-gruh-fee scan). A procedure in which a small amount of radioactive glucose (sugar) is injected into a vein, and a scanner is used to make detailed, computerized pictures of areas inside the body where the glucose is used. Because cancer cells often use more glucose than normal cells, the pictures can be used to find cancer cells in the body.

**Radiation** (RAY-dee-AY-shun): Energy released in the form of particles or electromagnetic waves. Common sources of radiation include radon gas, cosmic rays from outer space, and medical x-rays.

**Radiation oncologist** (RAY-dee-AY-shun on-KAH-loh-jist): A doctor who specializes in using radiation to treat cancer.

**Radiation therapy** (RAY-dee-AY-shun THAYR-uh-pee): The use of high-energy radiation from x-rays, gamma rays, neutrons, and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external beam radiation therapy), or it may come from radioactive material placed in the body near cancer cells (internal radiation therapy). Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that circulates throughout the body. Also called radiotherapy and irradiation.

**Radioactive fallout** (RAY-dee-oh-AK-tiv): Airborne radioactive particles that fall to the ground during and after an atomic bombing, nuclear weapons test, or nuclear plant accident.

**Radioactive iodine** (RAY-dee-oh-AK-tiv I-oh-dine): A radioactive form of iodine, often used for imaging tests or to treat overactive thyroid, thyroid cancer, and certain other cancers. For imaging tests, the patient swallows a small dose of radioactive iodine that collects in thyroid cells and certain kinds of tumors and can be detected by a scanner. To treat thyroid cancer, the patient swallows a large dose of radioactive iodine, which kills thyroid cells.

**Registered dietitian** (dy-eh-TIH-shun): A health professional with special training in the use of diet and nutrition to keep the body healthy. A registered dietitian may help the medical team improve the nutritional health of a patient.

**Surgeon:** A doctor who removes or repairs a part of the body by operating on the patient.

**Surgery** (SER-juh-ree): A procedure to remove or repair a part of the body or to find out whether disease is present. An operation.

**Surgical biopsy** (SER-jih-kul BY-op-see): The removal of tissues by a surgeon for examination by a pathologist. The pathologist may study the tissue under a microscope.

**Systemic therapy** (sis-TEH-mik THAYR-uh-pee): Treatment using substances that travel through the bloodstream, reaching and affecting cells all over the body.

**Thyroglobulin** (THIGH-roe-GLOB-yoo-lin): The form that thyroid hormone takes when stored in the cells of the thyroid. If the thyroid has been removed, thyroglobulin should not show up on a blood test.

Doctors measure the thyroglobulin level in blood to detect thyroid cancer cells that remain in the body after treatment.

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

***Thyroid follicular cell*** (THY-royd fuh-LIK-yoo-ler): A type of cell in the thyroid. Thyroid follicular cells make thyroid hormone.

***Thyroid hormone*** (THY-royd HOR-mone): A hormone that affects heart rate, blood pressure, body temperature, and weight. Thyroid hormone is made by the thyroid gland and can also be made in the laboratory.

***Thyroid hormone treatment*** (THY-royd HOR-mone): Treatment with thyroid hormone, which is a hormone that affects heart rate, blood pressure, body temperature, and weight.

***Thyroid-stimulating hormone*** (THY-royd STIM-yoo-LAY-ting HOR-mone): TSH. A hormone produced by the pituitary gland. TSH stimulates the release of thyroid hormone from thyroglobulin. It also stimulates the growth of thyroid follicular cells. An abnormal TSH level may mean that the thyroid hormonal regulation system is out of control, usually as a result of a benign condition (hyperthyroidism or hypothyroidism).

***Thyroidectomy*** (THY-roy-DEK-toh-mee): Surgery to remove part or all of the thyroid.

***Thyroidologist*** (THY-roy-DOL-oh-jist): A medical doctor who specializes in thyroid diseases.



***Tumor*** (TOO-mer): An abnormal mass of tissue that results when cells divide more than they should or do not die when they should. Tumors may be benign (not cancerous), or malignant (cancerous). Also called neoplasm.

***Ultrasound*** (UL-truh-SOWND): A procedure in which high-energy sound waves (ultrasound) are bounced off internal tissues or organs and make echoes. The echo patterns are shown on the screen of an ultrasound machine, forming a picture of body tissues called a sonogram. Also called ultrasonography.

***X-ray***: A type of high-energy radiation. In low doses, x-rays are used to diagnose diseases by making pictures of the inside of the body. In high doses, x-rays are used to treat cancer.

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## National Cancer Institute Information Resources

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You may want more information for yourself, your family, and your doctor. The following NCI services are available to help you.

### Telephone

NCI's Cancer Information Service (CIS) provides accurate, up-to-date information about cancer to patients and their families, health professionals, and the general public. Information specialists translate the latest scientific information into plain language and respond in English or Spanish. Calls to the CIS are confidential and free.

Telephone: **1-800-4-CANCER** (1-800-422-6237)

TTY: 1-800-332-8615

### Internet

NCI's Web site provides information from numerous NCI sources. It offers current information about cancer prevention, screening, diagnosis, treatment, genetics, supportive care, and ongoing clinical trials. It has information about NCI's research programs, funding opportunities, and cancer statistics.

Web site: **<http://www.cancer.gov>**

Spanish Web site: **<http://www.cancer.gov/espanol>**

If you're unable to find what you need on the Web site, contact NCI staff. Use the online contact form at **<http://www.cancer.gov/contact>** or send an email to **[cancergovstaff@mail.nih.gov](mailto:cancergovstaff@mail.nih.gov)**.

Also, information specialists provide live, online assistance through **LiveHelp** at **<http://www.cancer.gov/help>**.

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## National Cancer Institute Publications

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NCI provides information about cancer, including the publications mentioned in this booklet. Many are available in both English and Spanish.

You may order these materials by telephone, on the Internet, or by mail. You may also read them online and print your own copy.

- **By telephone:** People in the United States and its territories may order these and other NCI publications by calling the NCI's Cancer Information Service at **1-800-4-CANCER**.
- **On the Internet:** Many NCI publications may be viewed, downloaded, and ordered from **<http://www.cancer.gov/publications>** on the Internet. People in the United States and its territories may use this Web site to order printed copies. This Web site also explains how people outside the United States can mail or fax their requests for NCI booklets.
- **By mail:** NCI publications may be ordered by writing to the address below:

Publications Ordering Service  
National Cancer Institute  
Suite 3035A  
6116 Executive Boulevard, MSC 8322  
Bethesda, MD 20892-8322

## **Treatment**

- *Radiation Therapy and You* (also available in Spanish: *La radioterapia y usted*)
- *Radiation Therapy for Cancer: Questions and Answers*
- *Chemotherapy and You* (also available in Spanish: *La quimioterapia y usted*)
- *How To Find a Doctor or Treatment Facility If You Have Cancer* (also available in Spanish: *Cómo encontrar a un doctor o un establecimiento de tratamiento si usted tiene cáncer*)

## **Living With Cancer**

- *Eating Hints for Cancer Patients* (also available in Spanish: *Consejos de alimentación para pacientes con cáncer*)
- *Pain Control* (also available in Spanish: *Control del dolor*)
- *Facing Forward Series: Life After Cancer Treatment* (also available in Spanish: *Siga adelante: la vida después del tratamiento del cáncer*)
- *Facing Forward Series: Ways You Can Make a Difference in Cancer*
- *Taking Time: Support for People with Cancer*
- *Coping with Advanced Cancer*
- *When Cancer Returns*

## **Clinical Trials**

- *Taking Part in Cancer Treatment Research Studies*

## **Complementary Medicine**

- *Thinking About Complementary & Alternative Medicine: A guide for people with cancer*
- *Complementary and Alternative Medicine in Cancer Treatment: Questions and Answers* (also available in Spanish: *La medicina complementaria y alternativa en el tratamiento del cáncer: preguntas y respuestas*)

## **Radioactive Iodine Fallout**

- *Get the Facts About Exposure to I-131 Radiation*
- *Making Choices: Screening for Thyroid Disease*
- *I-131 and Radioactive Fallout: Questions and Answers*

## **Caregivers**

- *When Someone You Love Is Being Treated for Cancer: Support for Caregivers*
- *When Someone You Love Has Advanced Cancer: Support for Caregivers*
- *Facing Forward: When Someone You Love Has Completed Cancer Treatment*

## **¿Necesita información en español?**

Llame al Servicio de Información sobre el Cáncer y hable en español con un especialista en información. El número es **1-800-422-6237**.

O visite el sitio de Internet del Instituto Nacional del Cáncer en **<http://www.cancer.gov/espanol>**.

### **The National Cancer Institute**

The National Cancer Institute (NCI) is part of the National Institutes of Health. NCI conducts and supports basic and clinical research in the search for better ways to prevent, diagnose, and treat cancer. NCI also supports the training of scientists and is responsible for communicating its research findings to the medical community and the public.

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