



What is Thyroid Cancer?

Thyroid cancer is a group of malignant tumors that originate from the thyroid gland. The thyroid is a gland in the front of the neck. The thyroid gland absorbs iodine from the bloodstream so it can produce thyroid hormone (it regulates body metabolism and temperature, it affects the heart rate, and its lack is associated with decrease in energy levels or fatigue). The thyroid gland contains two types of cells: follicular cells, which are responsible for the production of thyroid hormone; and C cells, which make calcitonin, a hormone that participates in the calcium metabolism.

A healthy thyroid gland is barely palpable. A normal gland has two lobes on each side of the windpipe, joined by a narrow strip of tissue called the isthmus. If a mass develops in the thyroid, it is felt as a lump in the neck. A diffusely swollen thyroid gland is called a goiter, which may be due to iodine deficiency. The gland is located on the trachea (windpipe) just below the larynx (voice box) Thyroid tissue growths are known as nodules. Ninety percent (90%) of all thyroid growths are benign and ten percent (10%) of thyroid nodules are malignant. Cancer cells can spread into neighboring tissues and organs, and enter the lymphatic system and the bloodstream.

Here are four types of thyroid cancer:

Papillary Thyroid Cancer - Papillary cancer develops in the follicular cells and grows slowly. It is usually found in one lobe; only 10% to 20% of papillary cancers appear in both lobes.

Follicular Thyroid Cancer - Follicular cancer also develops in the follicular cells and grows slowly, yet is less common. When detected early, it can be treated successfully.

Papillary and follicular cancers make up 80% to 90% of thyroid cancers, and are grouped under the term differentiated thyroid cancer. When detected early, especially in people below the age of 45-50 years, it can be treated successfully.

Medullary Thyroid Cancer - Medullary cancer develops in the C cells. It can be controlled if it is found and treated before it spreads to other parts of the body. Medullary cancer accounts for 5% to 10% of thyroid cancers.

Anaplastic Thyroid Cancer - This is a very rare and aggressive form of thyroid cancer that takes its origin from differentiated thyroid cancer or other benign tumors of the gland, and in its giant cell variety is often rapidly fatal.

As we well know, there are many kinds of cancer; unfortunately they all come about because of the out-of-control growth of abnormal cells.

Healthy Cells vs. Cancer Cells

Healthy cells are like a cat. They need structure to determine the size of bones and shape of the body, tail and whiskers. The DNA in genes and chromosomes determine this. They need energy to play and prowl and sustain life. This is derived from chemicals in food. Cats need a system to deliver chemicals (food nutrients like amino acids, carbohydrates, fats, vitamins and minerals) to all parts of their body. These are the blood vessels. Growth factors take a kitten into a lazy old cat, all the while helping it to function normally.

The body and its cells are mostly made up of protein. The building blocks of proteins are substances called amino acids that in the form of enzymes and hormones literally control every chemical reaction within the cells. When these are modified, different messages are sent to a complex control system that can alter their function. There are twenty different kinds of amino acids that are essential to life. Twelve of these can be synthesized within the body however; eight must be supplied by the daily diet.

Structure	
Normal Cells	Cancer Cells
DNA in genes and chromosomes go about their business in a normal way.	Cancer cells develop a different DNA or gene structure or acquire abnormal numbers of chromosomes.
Cells divide in an orderly way to produce more cells only when the body needs them.	Cells continue to be created without control or order. If not needed, a mass of tissue is formed which is called a tumor.
Energy	
Normal Cells	Cancer Cells
Cells derive 70% of their energy from a system called the "Krebs Cycle."	Cells have a defective "Krebs Cycle" and derive little or no energy from it.
Cells derive only 20% of their energy from a system called "Glycolosis."	Cancer cells derive almost all their energy from "Glycolosis."
Cells derive most of their energy with the use of oxygen.	Cells derive most of their energy in the absence of oxygen.
Blood Vessels	
Normal Cells	Cancer Cells
Cells have a built-in blood vessel system.	Cells do not have a built-in blood vessel system. They require more of certain amino acids to grow.

Growth Factors	
Normal Cells	Cancer Cells
While similar to cancer cells, the amount of them is more in balance to produce a more normal level of activity.	These cells have over produced, require more chemicals (food) and are over active.
Functions	
Normal Cells	Cancer Cells
The enzymes and hormones go about business in a normal balanced manner.	The enzymes and hormones are either over active or under active.
Tumors are Different	
Benign	Malignant
Benign tumors are not cancerous. They do not invade nearby tissues nor spread to other parts of the body. They can be removed and are not a threat to life.	Malignant tumors are cancerous. They can invade and damage nearby tissues and organs and they can break away and enter the blood stream to form new tumors in other parts of the body. The spread of cancer is called metastasis.

What causes thyroid cancer?

Doctors do not know what causes most cases of thyroid cancer. However, scientists have observed that thyroid cancer affects women two to three times as often as men and occurs more frequently in whites than in blacks. Scientists do not fully understand the reasons for these patterns; they continue to study thyroid cancer to try to learn what may increase a person's risk for this disease.

One known risk factor is exposure to radiation during childhood. Before doctors knew of its dangers, radiation therapy was used to treat acne and to reduce swelling and infection in organs such as the thymus, tonsils, and lymph nodes. People who received radiation to the head and neck as children have a higher- than-average risk of developing thyroid cancer many years later. Scientists are doing studies to determine whether other types of radiation exposure also can cause thyroid cancer.

Can thyroid cancer be detected early?

The National Cancer Institute recommends that anyone who received radiation to the head or neck in childhood be examined by a doctor every 1 to 2 years. Also, people should see a doctor if they have a family member with medullary thyroid cancer. The most important part of a checkup is the careful examination of the neck, feeling for lumps in the thyroid and enlargement of nearby lymph nodes. A thyroid scan (scintogram) or ultrasonography may be recommended for people at risk for thyroid cancer.

What are symptoms of thyroid cancer?

The most common symptom of thyroid cancer is a lump, or nodule, that can be felt in the neck. Other symptoms are rare. Pain is seldom an early warning sign of thyroid cancer. However, a few patients have a tight or full feeling in the neck, difficulty breathing or swallowing, hoarseness, or swollen lymph nodes. These symptoms can be caused by

thyroid cancer or by other, less serious problems. If a person is experiencing symptoms, a doctor should be consulted.

How is thyroid cancer diagnosed?

The doctor can use several tests to learn the size and location of a thyroid nodule and/or to help determine whether a lump is benign (not cancerous) or malignant (cancerous). For example, the doctor may order blood tests to check how well the patient's thyroid is functioning. Also, a radioactive iodine scan can outline abnormal areas of the thyroid. For the scan, the patient is given a very small amount of a radioactive substance (usually iodine I-131 or technetium TC-99m), which collects in the thyroid. An instrument called a scanner can detect "cold spots" (areas in the thyroid that do not absorb iodine normally). Because cold spots can be benign or malignant, further tests are necessary.

Ultrasonography is another technique for producing a picture of the thyroid. In this procedure, high-frequency sound waves, which cannot be heard by humans, pass into the thyroid. The patterns of echoes produced by these waves are converted into a picture (sonogram) by a computer. Doctors can tell whether nodules are fluid-filled cysts, which are usually benign, or solid lumps that might be malignant.

The only sure way to tell whether a patient has thyroid cancer is to look at cells from the thyroid with a microscope. There are two ways to obtain a sample of thyroid tissue: by withdrawing cells using a needle (needle biopsy) or by surgically removing the tumor (surgical biopsy). In either case, a pathologist examines the tissue under a microscope to look for cancer cells.

If the needle biopsy does not show cancer, the doctor may give the patient thyroid hormones. These hormones make it unnecessary for the thyroid to produce its own hormones, and the gland, including the nodule, shrinks and becomes inactive. If the needle biopsy is not conclusive or if the thyroid hormones are not effective, the patient usually has a surgical biopsy.

When thyroid cancer is diagnosed, doctors may do more tests to learn about the stage (extent) of the disease. The results of these tests help doctors plan appropriate treatment.

What treatment is there for thyroid cancer?

Surgery is the most common form of treatment for thyroid cancer that has not spread to distant parts of the body. The surgeon usually removes part or all of the thyroid and any other affected tissue, such as lymph nodes. (If the patient has a surgical biopsy, the biopsy and the removal of the thyroid may be done in the same operation).

Patients with localized papillary or follicular thyroid cancer also may receive treatment with I-131 (a larger dose than that used in a thyroid scan). The patient swallows the iodine, which collects in any thyroid cancer cells that remain in the body after surgery. By damaging such cancer cells, the radioactive iodine helps prevent the disease from recurring. The patient must remain in the hospital for a few days while the radiation is most active. The treatment may be repeated at a later time.

Hormones usually are given to patients who have had surgery to remove the thyroid and/or treatment with radioactive iodine. The hormones replace those that are normally produced by the thyroid. This treatment also slows down the growth of any remaining thyroid cancer cells. The doctor may need to do follow-up tests to determine whether the patient is receiving the proper amount of the necessary hormones.

Surgery may not be recommended when a patient is found to have thyroid cancer that has spread. Treatment usually includes some form of systemic therapy (treatment that can kill or slow the growth of thyroid cancer cells throughout the body), such as chemotherapy, radioactive iodine therapy, and/or hormone therapy. Regular follow-up is very important after treatment for thyroid cancer. Follow-up care may include periodic complete physician exams, x-rays, scans, and blood tests.

Stages of thyroid cancer

Once thyroid cancer is found (diagnosed), more tests will be done to find out if cancer cells have spread to other parts of the body. This is called staging. A doctor needs to know the stage of the disease to plan treatment.

Papillary and follicular thyroid cancer

The following stages are used for papillary and follicular thyroid cancer:

Stage I

- In patients younger than 45 years, cancer may have spread within the neck or upper chest and/or to nearby lymph nodes but not to other parts of the body.
- In patients aged 45 years and older, the tumor is 2 centimeters (about $\frac{3}{4}$ inch) or smaller and in the thyroid only.

Stage II

- In patients younger than 45 years, the cancer has spread to distant parts of the body, such as the lung or bone, and may have spread to nearby lymph nodes.
- In patients aged 45 years and older, the tumor is larger than 2 centimeters but not larger than 4 centimeters (between $\frac{3}{4}$ and $1\frac{1}{2}$ inches) in the thyroid only.

Stage III

The cancer is found in patients aged 45 years or older. The tumor either:

- is larger than 4 centimeters; or
- may be any size and has spread just outside the thyroid and/or to lymph nodes in the neck.

Stage IVA

The cancer is found in patients aged 45 years or older. The tumor may be any size and has spread within the neck and/or to lymph nodes in the neck or upper chest.

Stage IVB

The cancer is found in patients aged 45 years or older. The tumor may be any size and has spread to neck tissues near the backbone or around blood vessels in the neck or upper chest. Cancer may have spread to lymph nodes.

Stage IVC

The cancer has spread to other parts of the body, such as the lung or bone, and may have spread to nearby lymph nodes.

Medullary thyroid cancer

The following stages are used for medullary thyroid cancer:

Stage 0

No tumor is found in the thyroid but the cancer is detected by screening tests. Stage 0 is also called carcinoma in situ.

Stage I

The tumor is 2 centimeters or smaller and in the thyroid only.

Stage II

The tumor is larger than 2 centimeters but not larger than 4 centimeters and is in the thyroid only.

Stage III

The tumor either:

- is larger than 4 centimeters; or
- may be any size and has spread just outside the thyroid and/or to lymph nodes in the neck.

Stage IVA

The tumor may be any size and has spread within the neck and/or to lymph nodes in the neck or upper chest.

Stage IVB

The tumor may be any size and has spread to neck tissues near the backbone or around blood vessels in the neck or upper chest. Cancer may have spread to lymph nodes.

Stage IVC

Cancer has spread to other parts of the body, such as the lung or bone, and may have spread to nearby lymph nodes.

Medullary Thyroid Cancer Treatment

Treatment may be one of the following:

1. Total thyroidectomy for tumors in the thyroid only. Lymph nodes in the neck may also be removed.
2. Radiation therapy for tumors that come back in the thyroid as palliative treatment to relieve symptoms and improve the patient's quality of life.
3. Chemotherapy for cancer that has spread to other parts of the body, as palliative treatment to relieve symptoms and improve the patient's quality of life.

Anaplastic thyroid cancer

Anaplastic thyroid cancer is considered to be stage IV thyroid cancer. It grows quickly and has usually spread within the neck when it is found. Anaplastic thyroid cancer develops most often in older people.

Anaplastic Thyroid Cancer Treatment

Treatment may be one of the following:

1. Surgery to create an opening in the windpipe, for tumors that block the airway. This is called a tracheostomy.
2. Total thyroidectomy to reduce symptoms if the tumor is in the area of the thyroid only.
3. External-beam radiation therapy.
4. Chemotherapy.
5. Clinical trials of chemotherapy and radiation therapy following thyroidectomy.
6. Clinical trials studying new methods of treatment of thyroid cancer.

Recurrent thyroid cancer

Recurrent disease means that the cancer has come back (recurred) after it has been treated. It may come back in the thyroid or in other parts of the body.

Recurrent Thyroid Cancer Treatment

The choice of treatment depends on the type of thyroid cancer the patient has, the kind of treatment the patient had before, and where the cancer comes back. Treatment may be one of the following:

1. Surgery with or without radioactive iodine. A second surgery may be done to remove tumor that remains.
2. Radioactive iodine.
3. External-beam radiation therapy or radiation therapy given during surgery to relieve symptoms caused by the cancer.
4. Chemotherapy.
5. Clinical trials of new treatments.

How thyroid cancer is treated

There are treatments for all patients with thyroid cancer. Four types of treatment are used:

- Surgery (taking out the cancer).
- Radiation therapy (using high-dose x-rays or other high-energy rays to kill cancer cells).
- Hormone therapy (using hormones to stop cancer cells from growing).
- Chemotherapy (using drugs to kill cancer cells).

Surgery is the most common treatment of thyroid cancer. A doctor may remove the cancer using one of the following operations:

- Lobectomy removes only the side of the thyroid where the cancer is found. Lymph nodes in the area may be taken out (biopsied) to see if they contain cancer.
- Near-total thyroidectomy removes all of the thyroid except for a small part.
- Total thyroidectomy removes the entire thyroid.
- Lymph node dissection removes lymph nodes in the neck that contain cancer.

Radiation therapy uses high-energy x-rays to kill cancer cells and shrink tumors. Radiation for thyroid cancer may come from a machine outside the body (external radiation therapy) or from drinking a liquid that contains radioactive iodine. Because the thyroid takes up iodine, the radioactive iodine collects in any thyroid tissue remaining in the body and kills the cancer cells.

Hormone therapy uses hormones to stop cancer cells from growing. In treating thyroid cancer, hormones can be used to stop the body from making other hormones that might make cancer cells grow. Hormones are usually given as pills.

Chemotherapy uses drugs to kill cancer cells. Chemotherapy may be taken by pill, or it may be put into the body by a needle in the vein or muscle. Chemotherapy is called a systemic treatment because the drug enters the bloodstream, travels through the body, and can kill cancer cells outside the thyroid.

Treatment by stage

Treatment of thyroid cancer depends on the type and stage of the disease, and the patient's age and overall health.

Stage I and II Papillary and Follicular Thyroid Cancer

Treatment may be one of the following:

1. Surgery to remove the thyroid (total thyroidectomy). This may be followed by hormone therapy and radioactive iodine.
2. Surgery to remove one lobe of the thyroid (lobectomy), followed by hormone therapy. Radioactive iodine also may be given following surgery.

Stage III Papillary and Follicular Thyroid Cancer

Treatment may be one of the following:

1. Surgery to remove the entire thyroid (total thyroidectomy) and lymph nodes where cancer has spread.
2. Total thyroidectomy followed by radiation therapy with radioactive iodine or external-beam radiation therapy.

Stage IV Papillary and Follicular Thyroid Cancer

Treatment may be one of the following:

1. Radioactive iodine.
2. External-beam radiation therapy.
3. Surgery to remove the cancer from places where it has spread.
4. Hormone therapy.
5. A clinical trial of new treatments, including chemotherapy.

Source: A.P. John Institute for Cancer Research

When considering any type of complementary cancer treatment or alternative cancer treatment, always consult with your physician first, as possible interactions could reduce your treatment protocol's efficacy.