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## About Thymus Cancer

### Overview

If you have been diagnosed with thymus cancer or are worried about it, you likely have a lot of questions. Learning some basics is a good place to start.

- [What Is Thymus Cancer?](#)

### Research and Statistics

See the latest estimates for new cases of thymus cancer in the US and what research is currently being done.

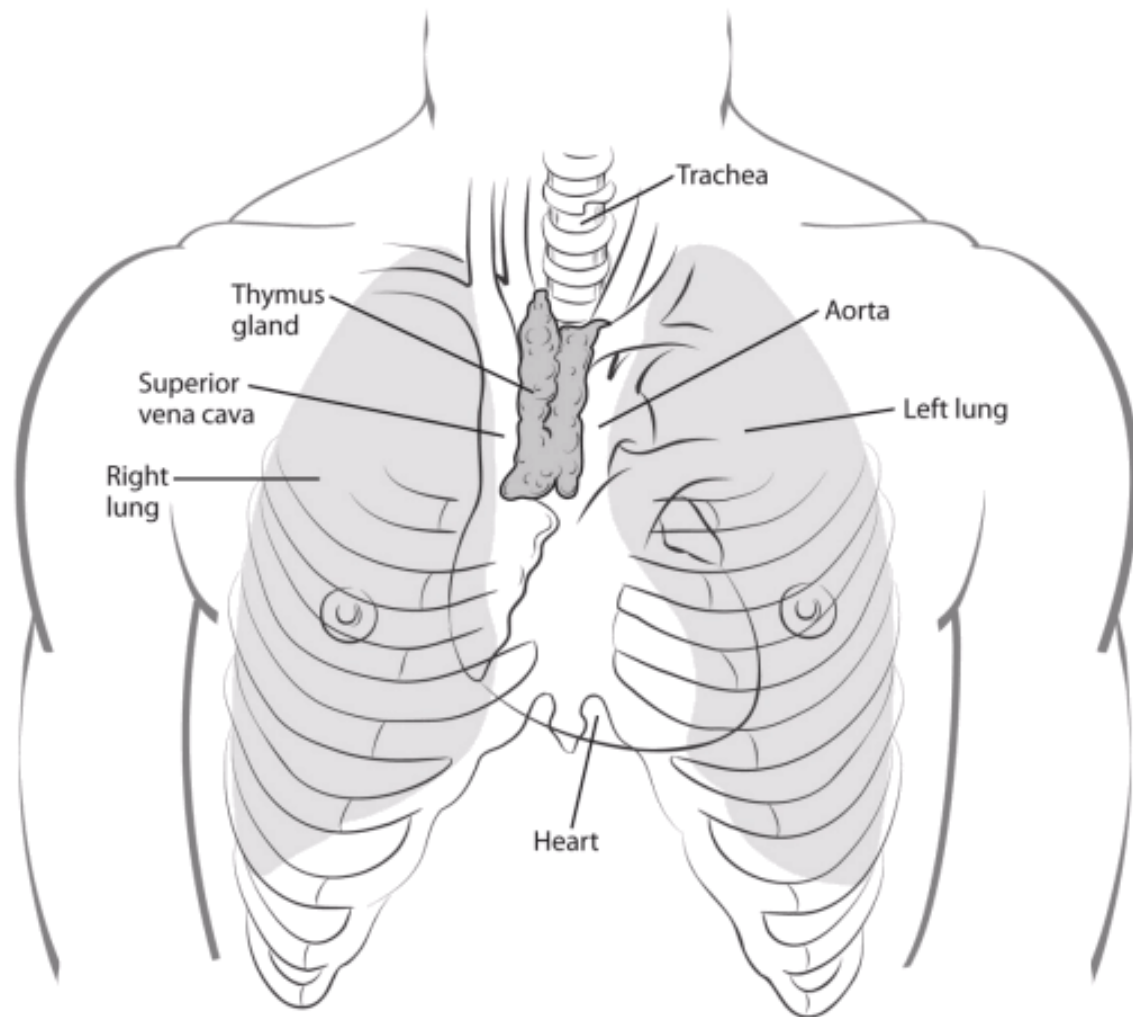
- [Key Statistics About Thymus Cancers](#)
  - [What's New in Thymus Cancer Research?](#)
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## What Is Thymus Cancer?

Cancer starts when cells in the body start to grow out of control. Cells in nearly any part of the body can become cancer, and can spread to other parts of the body. To learn more about how cancers start and spread, see [What Is Cancer?](#)<sup>1</sup>

Thymus cancers are rare. The thymus is a small organ located just behind the breast bone (sternum) in the front part of the chest. The thymus is in a part of the chest called the *mediastinum*, the space in the chest between the lungs that also contains the heart,

part of the aorta, the esophagus (the tube that connects the mouth to the stomach), part of the trachea (windpipe), and many lymph nodes. The thymus sits just in front of and above the heart.



The thymus is divided into 2 halves, called *lobes*. It has an irregular shape. There are a lot of small bumps called *lobules* on its surface. The thymus has 3 main layers:

- The **medulla** is the inside part of the thymus.
- The **cortex** is the layer that surrounds the medulla.
- The **capsule** is the thin covering over the outside of the thymus.

The thymus reaches its maximum weight of about 1 ounce during puberty. Then it decreases in size during adulthood as it's replaced by fat tissue.

**The thymus is an important part of the body's immune system.** During fetal development and childhood, the thymus is involved in the production and maturation of T lymphocytes (also known as *T cells*), a type of white blood cell. T lymphocytes develop in the thymus and then travel to lymph nodes (bean-sized collections of immune system cells) throughout the body. There they help the immune system protect the body from viruses, fungus, and other types of infections.

The thymus is made of different types of cells. Each kind can develop into different types of cancer:

- Epithelial cells give the thymus its structure and shape. **Thymomas and thymic carcinomas**, which are the main focus of the rest of this document, develop from these cells.
- Lymphocytes make up most of the rest of the thymus. Whether in the thymus or in other parts of the body, these immune system cells can develop into cancers called [Hodgkin disease](#)<sup>2</sup> and [non-Hodgkin lymphoma](#)<sup>3</sup>.
- Kulchitsky cells, or neuroendocrine cells, are much less common cells that normally release certain hormones. These cells can give rise to cancers called *carcinoid tumors*. This document does not discuss carcinoid tumors of the thymus. Much of the information in [Lung Carcinoid Tumor](#)<sup>4</sup> and [Gastrointestinal Carcinoid Tumors](#)<sup>5</sup> also applies to carcinoids of the thymus.

## Thymomas and thymic carcinomas

**Thymomas and thymic carcinomas are tumors that start from thymic epithelial cells.** Not all doctors agree about the best way to describe and classify these tumors. In the past, thymomas were sometimes divided into benign (non-cancer) thymomas and malignant (cancer) thymomas, based on whether they had grown beyond the thymus into other tissues or organs. Now, most doctors think all thymomas may become cancer over time, and the best way to predict how likely they are to come back after treatment is to describe whether they have grown into tissues beyond the thymus (and if so, how far). This is done by the surgeon who notes whether or not the tumor is attached to nearby organs and by the pathologist who looks at samples from the margins (edges) of the tumor under the microscope. The system used to describe the stage (extent) of thymomas is covered in [How Is Thymus Cancer Staged?](#)<sup>6</sup>

## WHO classification system for thymomas

Most doctors also classify thymomas by how they look under a microscope and by tests done on the tissue samples. This is called the *histologic type*. The system used for this classification, which was developed by the World Health Organization (WHO), assigns letters to the different types of thymomas.

**Type A:** The cells in these tumors are spindle-shaped or oval epithelial cells that are fairly normal looking. This is the rarest type of thymoma, but it seems to have the best prognosis (outlook).

**Type AB:** This type, also known as a *mixed thymoma*, looks like type A but there are also areas of lymphocytes mixed in the tumor.

**Type B1:** This type looks a lot like the normal structure of the thymus. It has a lot of lymphocytes along with normal-looking thymus cells.

**Type B2:** This type also has a lot of lymphocytes, but the thymus epithelial cells are larger with abnormal nuclei (the DNA-containing part of the cell).

**Type B3:** This type has few lymphocytes and mostly made of thymus epithelial cells that look pretty close to normal.

**Type C:** This is the most dangerous form and is also known as *thymic carcinoma*. It contains cells that look very abnormal under the microscope. The cells may no longer even look like thymus cells. These tumors have often grown into nearby tissues and/or spread to distant tissues and organs (metastasized) at the time they are found. This type of thymoma has the worst outlook (prognosis).

Type AB and type B2 are the most common types of thymoma, and type A is the least common. As you go from A to C, the outlook for survival tends to get worse. Type A has the best outlook, and type C has the worst. Still, for most types of thymoma, the [stage](#)<sup>7</sup> (extent of growth and spread) is a better predictor of a person's outcome.

## Other cancers in the mediastinum

Other cancers and tumors can occur in the mediastinum. Cancers can start in the esophagus ([esophageal cancer](#)<sup>8</sup>), in the heart (and the tissue surrounding it), in the [trachea](#)<sup>9</sup>, and in the lymph nodes ([lymphoma](#)<sup>10</sup>).

Rarely, cancers and tumors known as *germ cell tumors* can also start in the

mediastinum. These come from cells like those found in the testicles and ovaries.

Sometimes the thyroid gland, which is normally in the neck, is misplaced into the mediastinum. This can become enlarged, called a *goiter*. A [thyroid tumor or cancer](#)<sup>11</sup> can also develop in the mediastinum.

More often, cancer spreads there from other areas, especially the [lungs](#)<sup>12</sup>.

## Hyperlinks

1. [www.cancer.org/cancer/cancer-basics/what-is-cancer.html](http://www.cancer.org/cancer/cancer-basics/what-is-cancer.html)
2. [www.cancer.org/cancer/hodgkin-lymphoma.html](http://www.cancer.org/cancer/hodgkin-lymphoma.html)
3. [www.cancer.org/cancer/non-hodgkin-lymphoma.html](http://www.cancer.org/cancer/non-hodgkin-lymphoma.html)
4. [www.cancer.org/cancer/lung-carcinoid-tumor.html](http://www.cancer.org/cancer/lung-carcinoid-tumor.html)
5. [www.cancer.org/cancer/gastrointestinal-carcinoid-tumor.html](http://www.cancer.org/cancer/gastrointestinal-carcinoid-tumor.html)
6. [www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html](http://www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html)
7. [www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html](http://www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html)
8. [www.cancer.org/cancer/esophagus-cancer.html](http://www.cancer.org/cancer/esophagus-cancer.html)
9. [www.cancer.org/cancer/laryngeal-and-hypopharyngeal-cancer.html](http://www.cancer.org/cancer/laryngeal-and-hypopharyngeal-cancer.html)
10. [www.cancer.org/cancer/lymphoma.html](http://www.cancer.org/cancer/lymphoma.html)
11. [www.cancer.org/cancer/thyroid-cancer.html](http://www.cancer.org/cancer/thyroid-cancer.html)
12. [www.cancer.org/cancer/lung-cancer.html](http://www.cancer.org/cancer/lung-cancer.html)

## References

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Key Statistics About Thymus Cancers

Although thymic tumors are the most common tumors in the anterior mediastinum (the front part of the chest cavity), overall they are rare. They occur at a rate of only 1.5

cases for every million people each year in the US. This works out to about 400 cases per year (the exact number diagnosed each year is not known).

Survival statistics for thymomas are discussed in [Survival rates for thymus cancer](#)<sup>1</sup>.

## Hyperlinks

1. [www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/survival-rates.html](http://www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/survival-rates.html)

## References

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# What's New in Thymus Cancer Research?

There's always research going on in the area of thymic tumors. Scientists are looking for causes of thymic tumors, and doctors are working to improve treatments.

Because thymic tumors are rare, more information from [clinical trials](#)<sup>1</sup> is needed to decide which treatments are best for each type and stage. For instance, the role of [chemotherapy](#)<sup>2</sup> in treating thymomas is still being explored. New treatments are also being developed and tested. For example, it's been suggested that hyperthermic intrathoracic chemotherapy (called HITHOC) during surgery might be useful in late stage thymic cancers. But more research is needed.

Researchers are looking for more accurate ways of predicting how aggressive a tumor is so the best treatment can be chosen. Improving imaging tests may also help doctors better decide which tumors can be safely removed with surgery.

Some studies are looking to see if treating with [chemotherapy](#)<sup>3</sup>(chemo) and/or [radiation](#)<sup>4</sup> before and/or after [surgery](#)<sup>5</sup> can help keep thymus cancer from coming back.

Removing or destroying all the cancer cells is not the only goal in treating thymomas. Some paraneoplastic syndromes may persist even after the tumor has been treated. Researchers are studying the causes of these syndromes and the best ways to treat them.

While chemotherapy can often help shrink thymus cancers, it doesn't always work and can have serious side effects. Chemo drugs work by attacking fast-growing cells, which is the main cause of their side effects. As researchers have learned more about what makes cancer cells different from normal cells, they have been able to make drugs that target these differences. Many of these drugs are already being used to treat other cancers. Researchers are trying to learn more about the genetic changes in thymus cancer cells. And studies are needed to look at how targeted therapies might be used to treat these cancers. These targeted therapies include anti-angiogenesis drugs (which affect tumors by limiting their blood supply) and anti-growth factor drugs (which interfere with substances some cancer cells make to stimulate their own growth). Some of these drugs are already being used to treat other cancers, and are being studied for use against thymus cancers. These include cetuximab, sunitinib, avelumab, pembrolizumab, erlotinib, and bevacizumab. Others being studied are not yet approved to treat any type of cancer.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)
2. [www.cancer.org/cancer/thymus-cancer/treating/chemotherapy.html](http://www.cancer.org/cancer/thymus-cancer/treating/chemotherapy.html)
3. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html)
4. [www.cancer.org/cancer/thymus-cancer/treating/radiation-therapy.html](http://www.cancer.org/cancer/thymus-cancer/treating/radiation-therapy.html)
5. [www.cancer.org/cancer/thymus-cancer/treating/surgery.html](http://www.cancer.org/cancer/thymus-cancer/treating/surgery.html)

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Hu B, Rong H, Han Y, Li Q. Do thymic malignancies respond to target therapies? *Interact Cardiovasc Thorac Surg*. 2015;20(6):855-859.

Jackson MW, Palma DA, Camidge DR, et al. The Impact of Postoperative Radiotherapy for Thymoma and Thymic Carcinoma. *J Thorac Oncol*. 2017;12(4):734-744.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology. Thymomas and Thymic Carcinomas. Version 1.2017--March 2, 2017.

Remon J, Lindsay CR, Bluthgen MV, Besse B. Thymic malignancies: Moving forward with new systemic treatments. *Cancer Treat Rev.* 2016;46:27-34.

Ried M, Marx A, Götz A, Hamer O, Schalke B, Hofmann HS. State of the art: diagnostic tools and innovative therapies for treatment of advanced thymoma and thymic carcinoma. *Eur J Cardiothorac Surg.* 2016;49(6):1545-1552.

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Thymus Cancer Causes, Risk Factors, and Prevention

## Risk Factors

A risk factor is anything that affects your chance of getting a disease such as cancer. Learn more about the risk factors for thymus cancer.

- [What Are the Risk Factors for Thymus Cancer?](#)
- [Do We Know What Causes Thymus Cancer?](#)

## Prevention

Because we do not know what causes most thymic cancers, it is not yet possible to know how to prevent them.

- [Can Thymus Cancer Be Prevented?](#)

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# What Are the Risk Factors for Thymus Cancer?

A risk factor is anything that affects your chance of getting a disease such as cancer. Different cancers have different risk factors. For example, exposing the skin to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for lung cancer and

many others.

But risk factors don't tell us everything. Having a known risk factor, or even several risk factors, does not mean that you will get the disease. And many people who get the disease may not have had any known risk factors.

No specific inherited, environmental, or lifestyle risk factors have been strongly linked to thymoma or thymic carcinoma. Some studies have suggested a possible link with exposure to radiation to the upper chest area, but this has not been confirmed. The only known risk factors are age and ethnicity.

## Age

The risk of this type of cancer goes up with age. This type of cancer is rare in children and young adults, is seen more often in middle-aged adults, and is most common in those in their 70s.

## Ethnicity

In the US, this cancer most common in Asians and Pacific Islanders and least common in Whites and Latinos. It is more common in African Americans than in Whites.

## References

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Do We Know What Causes Thymus Cancer?

Not much is known about why thymus cancers develop in some people but not in

others. Researchers have found some DNA changes that occur more often in thymus cancer cells than in normal cells. (DNA is the chemical in each of our cells that makes up our genes — the instructions for how our cells function.) However, they are still not certain why these changes occur in some people, exactly how the changes occur, and how the changes might cause cancer to form.

## References

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Can Thymus Cancer Be Prevented?

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# Thymus Cancer Early Detection, Diagnosis, and Staging

## Detection and Diagnosis

Finding cancer early, when it's small and hasn't spread, often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that is not always the case.

- [Can Thymus Cancer Be Found Early?](#)
- [Signs and Symptoms of Thymus Cancers](#)
- [Tests for Thymus Cancer](#)

## Stages and Outlook (Prognosis)

After a cancer diagnosis, staging provides important information about the amount of cancer in the body and expected response to treatment.

- [Thymus Cancer Stages](#)
- [Survival Rates for Thymus Cancer](#)

## Questions to Ask About Thymus Cancer

Here are some questions you can ask your cancer care team to help you better understand your diagnosis and treatment options.

- [Questions to Ask Your Doctor About Thymus Cancer](#)
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# Can Thymus Cancer Be Found Early?

Screening is testing for a disease like cancer in people without any symptoms. Thymus cancers are uncommon, and there are no widely recommended screening tests for them. Still, these cancers can sometimes be found early.

About 4 out of 10 people with thymomas have no symptoms when their tumor is found. In most of these cases the tumor is seen by chance on a test (like a chest x-ray or CT scan) that is done for some other reason.

Thymomas are often associated with symptoms that are not directly caused by the tumor mass itself. These are called *paraneoplastic syndromes* (tumor-related conditions). Some of these paraneoplastic syndromes, such as myasthenia gravis, red cell aplasia, and hypogammaglobulinemia, are described in [How Is Thymus Cancer Diagnosed?](#) These conditions can be very important in diagnosing some thymomas early because they may be present while the tumor is still at an early stage.

## References

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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## Signs and Symptoms of Thymus Cancers

Many thymic tumors are found on an x-ray or scan done for some other reason, before the patient has symptoms. The rest are brought to the attention of a doctor after a person starts to have symptoms. These may be related to the tumor itself, or they may be part of a paraneoplastic syndrome.

Although these signs and symptoms might be caused by thymus tumors, they can also

be caused by other conditions. Still, if you have any of these problems, it's important to see your doctor right away so the cause can be found and treated, if needed.

### Symptoms caused by the tumor

The thymus is in the middle of the chest, near the airways and certain blood vessels. Tumors in the thymus can press on nearby structures, causing symptoms such as:

- Shortness of breath
- Cough (which may bring up bloody sputum)
- Chest pain
- Trouble swallowing
- Loss of appetite
- Weight loss

The thymus is near the superior vena cava, the main blood vessel bringing blood from the head and upper body to the heart. Tumors that press on this vessel can cause symptoms of *superior vena cava syndrome*, which can include:

- Swelling in the face, neck, and upper chest, sometimes with a bluish color
- Swelling of the visible veins in this part of the body
- Headaches
- Feeling dizzy or light-headed

### Paraneoplastic syndromes

These are conditions that are related to the cancer but that are not caused directly by the tumor mass. For example, people with thymomas may develop autoimmune diseases, where the immune system starts to attack the body itself. Part of the normal function of the thymus is to help keep the immune system in check, which may help explain why this happens.

**Myasthenia gravis:** About 30% to 65% of people with thymomas also have myasthenia gravis (MG). This is by far the most common autoimmune disease associated with thymomas. In this disease, the immune system forms antibodies that block the chemical signals that signal the muscles to move. This causes severe muscle weakness. People with MG tire easily. They may notice problems climbing stairs or walking long distances.

Although patients have decreased muscle strength throughout the body, symptoms

caused by weakness of the muscles of the eyes, neck, and chest may be the most troublesome. Weakness of the eye muscles can cause blurred or double vision and drooping eyelids, while weak neck muscles can lead to problems with swallowing. Weakness of the chest muscles and diaphragm can cause problems breathing and shortness of breath.

Many people with thymomas have MG, but most people with MG don't have thymomas. Many people with MG have other, noncancerous abnormalities of the thymus gland. Myasthenia gravis can be treated by removing the thymus (whether or not a thymoma is present) or with medicines that either strengthen the chemical signals to muscles or weaken the immune attack on the muscles.

**Red cell aplasia:** Red cell aplasia, in which the body's ability to make new red blood cells is severely reduced, occurs in about 5% of thymoma patients. Red blood cells carry oxygen from the lungs to other tissues of the body. Reduced red blood cell production causes anemia (low red blood cell counts). Symptoms of anemia can include weakness, dizziness, shortness of breath, and tiring easily. The usual treatment is to remove the thymus gland.

**Hypogammaglobulinemia:** Hypogammaglobulinemia is a disorder in which the body makes low amounts of infection-fighting antibodies (also known as *gamma globulins*). This leaves the person susceptible to infections. About 5% to 10% of thymoma patients develop hypogammaglobulinemia. About 10% of patients with hypogammaglobulinemia have a thymoma. Removing the thymus does not help correct this disease.

**Other autoimmune diseases:** Many other autoimmune diseases have also been linked to thymoma. However, they are much less common than myasthenia gravis, pure red cell aplasia, or hypogammaglobulinemia. Some examples include:

- Systemic lupus erythematosus
- Polymyositis
- Ulcerative colitis
- Rheumatoid arthritis
- Sjogren (Sjögren) syndrome
- Sarcoidosis
- Scleroderma

Most people who have these autoimmune diseases do not have a thymoma.



## References

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# Tests for Thymus Cancer

If there is a reason to think you might have a thymus tumor, your doctor will ask you about symptoms and use one or more exams or tests to check for one. Certain [signs and symptoms](#) might suggest that a person may have a thymus tumor, but tests are needed to know for sure.

## Medical history and physical exam

If you have signs or symptoms that suggest you might have a thymus tumor, your doctor will want to take a complete medical history to check for symptoms. You will also be asked about your general health.

A physical exam provides information about possible signs of thymic cancer and other health problems. Patients with thymic cancer will sometimes have a fullness that the doctor can feel in the lower neck area.

Thymomas are often suspected if you have signs and symptoms associated with myasthenia gravis, hypogammaglobulinemia, or red cell aplasia .

## Imaging tests

Imaging tests use x-rays, magnetic fields, or radioactive substances to create pictures of the inside of your body. Imaging tests may be done for a number of reasons, including:

- To help find a suspicious area that might be cancer
- To learn how far cancer may have spread
- To help see if treatment is working

- To look for signs that cancer has come back

## **Chest x-ray**

A chest [x-ray](#)<sup>1</sup> may be the first imaging test a doctor orders if he or she suspects a problem in the middle of the chest. It may be able to show if there is a tumor in the chest. In some cases, a chest x-ray may find tumors when the person is having the x-ray done for another reason. But some thymomas are small or in places that may not show up on a chest x-ray. If your doctor is still suspicious or if a change is seen on the chest x-ray, a CT scan may be ordered.

## **Computed tomography (CT) scan**

A [CT scan](#)<sup>2</sup> uses x-rays to make detailed, cross-sectional images of your body. Unlike a regular x-ray, a CT scan creates detailed images of the soft tissues in the body. A chest CT with contrast is often used.

CT scans can also be used to guide a biopsy needle precisely into a suspected tumor or metastasis. This is called a *CT-guided needle biopsy*.

## **Magnetic resonance imaging (MRI) scan**

Like CT scans, [MRI scans](#)<sup>3</sup> provide detailed images of soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays.

MRI of the chest may be done to look more closely at thymus tumors. They are most often used for people who cannot have a CT scan for medical reasons (like problems with the IV contrast). MRI images are also particularly useful in looking for cancer that may have spread to the brain or spinal cord.

## **Positron emission tomography (PET) scan**

For a [PET scan](#)<sup>4</sup>, you are injected with a slightly radioactive form of sugar, which collects mainly in cancer cells. A special camera is then used to create a picture of areas of radioactivity in the body. The picture is not detailed like a CT or MRI scan, but a PET scan can look for possible areas of cancer spread in all areas of the body at once.

A PET scan can help give the doctor a better idea of whether a change seen on another imaging test is a tumor or not. If you have already been diagnosed with cancer, your

doctor may use this test to see if the cancer has spread to lymph nodes or other parts of the body. A PET scan can also be useful if your doctor thinks the cancer may have spread but doesn't know where.

Certain machines are able to perform both a PET and CT scan at the same time (PET/CT scan). This lets the doctor compare areas of higher radioactivity on the PET scan with the more detailed pictures of that area on the CT. Combined PET/CT is used more often than PET (alone) in looking at thymomas.

## Blood tests

Blood tests can't be used to diagnose thymomas, but they may be helpful in some situations. For example, blood tests may be done to look for certain antibodies if myasthenia gravis (MG) or another autoimmune disorder is suspected. Other blood tests might be done to make sure a mass in the middle of the chest isn't a germ cell tumor or part of the thyroid gland.

If a thymoma is diagnosed, blood cell counts and blood chemistry tests are done to get an idea of a person's overall health, especially if surgery is planned. Also, tests for myasthenia gravis will be done before any surgery. This is because MG is very common in people with a thymoma, and, if not treated, it can cause problems with the drugs used during surgery. People getting chemotherapy need regular blood tests to make sure the drugs aren't having unwanted effects on the bone marrow, kidneys, or other organs.

## Biopsy procedures

Although signs, symptoms, and imaging tests can suggest that a thymic tumor is likely, doctors can't be certain of the diagnosis without looking at the tumor under a microscope.

For most cancers, taking out a small piece of the tumor (known as a *biopsy*) is needed to confirm whether a tumor is present and, if so, to determine its type. For thymomas, this is rarely done because doctors can usually tell that the tumor is very likely a thymoma based on how it looks on imaging tests. Because of this, doctors often remove the entire tumor rather than do a biopsy. This provides tissue for a diagnosis and treats the tumor at the same time. The specimen is sent to the lab after surgery to confirm the diagnosis. See [Surgery For Thymus Cancer](#)<sup>5</sup> for more information.

If the tumor can't be removed completely during surgery, a biopsy might be done to confirm the diagnosis. This helps the doctor decide if more treatment is needed after surgery.

If the doctor suspects a different type of tumor, a biopsy (usually a needle biopsy) might be done before surgery.

See [Testing Biopsy and Cytology Specimens for Cancer](#)<sup>6</sup> to learn more about the types of biopsies, how the tissue is used in the lab to diagnose cancer, and what the results may show.

## Hyperlinks

1. [www.cancer.org/treatment/understanding-your-diagnosis/tests/x-rays-and-other-radiographic-tests.html](http://www.cancer.org/treatment/understanding-your-diagnosis/tests/x-rays-and-other-radiographic-tests.html)
2. [www.cancer.org/treatment/understanding-your-diagnosis/tests/ct-scan-for-cancer.html](http://www.cancer.org/treatment/understanding-your-diagnosis/tests/ct-scan-for-cancer.html)
3. [www.cancer.org/treatment/understanding-your-diagnosis/tests/mri-for-cancer.html](http://www.cancer.org/treatment/understanding-your-diagnosis/tests/mri-for-cancer.html)
4. [www.cancer.org/treatment/understanding-your-diagnosis/tests/nuclear-medicine-scans-for-cancer.html](http://www.cancer.org/treatment/understanding-your-diagnosis/tests/nuclear-medicine-scans-for-cancer.html)
5. [www.cancer.org/cancer/thymus-cancer/treating/surgery.html](http://www.cancer.org/cancer/thymus-cancer/treating/surgery.html)
6. [www.cancer.org/treatment/understanding-your-diagnosis/tests/testing-biopsy-and-cytology-specimens-for-cancer.html](http://www.cancer.org/treatment/understanding-your-diagnosis/tests/testing-biopsy-and-cytology-specimens-for-cancer.html)

## References

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology. Thymomas and Thymic Carcinomas. Version 1.2017--March 2, 2017.

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Thymus Cancer Stages

After someone is diagnosed with thymus cancer, doctors will try to figure out if it has spread, and if so, how far. This process is called *staging*. The stage of a cancer

describes the extent of the cancer in the body. It helps determine how serious the cancer is and [how best to treat it](#)<sup>1</sup>. Doctors also use a cancer's stage when talking about survival statistics.

Thymus cancer ranges from stages I (1) through IV (4). As a rule, the lower the number, the less the cancer has spread. A higher number, such as stage IV, means cancer has spread more. And within a stage, an earlier letter means a lower stage. Although each person's cancer experience is unique, cancers with similar stages tend to have a similar outlook and are often treated in much the same way.

## How is the stage determined?

The staging system used for thymus cancer is the American Joint Committee on Cancer (AJCC) **TNM** system, which is based on 3 key pieces of information:

- The extent (size) of the **tumor (T)**: Has the cancer grown into nearby structures and if so, how far as it grown?
- The spread to nearby lymph **nodes (N)**: Has the cancer spread to nearby superficial or deep lymph nodes?
- The spread (**metastasis**) to distant sites (**M**): Has the cancer spread to the outer linings of the lungs or heart or to distant organs?

The system described below is the most recent AJCC system effective January 2018. This staging system is used to stage thymomas, thymic carcinomas and neuroendocrine tumors of the thymus.

Numbers or letters after T, N, and M provide more details about each of these factors. Higher numbers mean the cancer is more advanced. Once a person's T, N, and M categories have been determined, this information is combined in a process called *stage grouping* to assign an overall stage. For more information see [Cancer Staging](#)<sup>2</sup>.

The staging system in the table below uses the *pathologic stage* (also called the *surgical stage*). It is determined by examining tissue removed during an operation. Sometimes, if [surgery](#)<sup>3</sup> is not possible right away or at all, the cancer will be given a *clinical stage* instead. This is based on the results of a [physical exam, biopsy, and imaging tests](#) (CT or MRI scan, x-rays, PET scan, etc) done *before* surgery.

Cancer staging can be complex, so ask your doctor to explain it to you in a way you understand.

AJCC Stage	Stage grouping	Stage description*
I	T1a N0 M0	The cancer has not spread into the outer layer of the thymus OR it has grown into the nearby fatty tissues but not into the mediastinal pleura (the thin layer covering the space between the 2 lungs) (T1a). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).
	OR	
II	T1b N0 M0	The cancer has grown into the nearby fatty tissue and the mediastinal pleura (the thin layer covering the space between the 2 lungs) (T1b). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
	T2 N0 M0	The cancer has grown into the nearby fatty tissue and into the pericardium (the tissue sac containing the heart) (T2).  It has not spread to nearby lymph nodes (N0) or distant sites (M0).
IIIA	T3 N0 M0	The cancer is growing into nearby tissues or organs, including the lungs, the vessels carrying blood into or out of the lungs, the main blood vessels taking blood away from the heart (the superior vena cava), or the phrenic nerve (the nerve that controls the diaphragm and breathing) (T3). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).
IIIB	T4 N0 M0	The cancer is growing into nearby tissues or organs, including the trachea (windpipe), esophagus (feeding tube), or the main blood vessels pumping blood away from the heart (T4). It has not spread to nearby lymph nodes (N0) or distant sites (M0).
IVA	Any T N1 M0	The cancer might or might not have grown into nearby tissues or organs (Any T) AND has spread to nearby lymph nodes in the front chest cavity (N1). It has not spread to distant sites (M0).
	OR	

	Any T N0 or N1 M1a	The cancer might or might not have grown into nearby tissues or organs (Any T) and might or might not have spread to nearby lymph nodes (N0 or N1). The cancer has spread to the pleura (lining of the lung) or the pericardium (lining of the heart) (M1a).
IVB	Any T N2 M0 or M1a	The cancer might or might not have grown into nearby tissues or organs (Any T) AND has spread to the lymph nodes deep in the chest cavity or the neck (N2) and might or might not have spread to the pleura (lining of the lung) or the pericardium (lining of the heart) (M0 or M1b).
	OR	
	Any T Any N M1b	The cancer might or might not have grown into nearby tissues or organs (Any T), might or might not have spread to nearby lymph nodes in the chest cavity or neck (Any N), but has spread to the inside of the lungs or other distant organs (M1b).

\* The following additional categories are not listed in the table above:

- **TX:** Main tumor cannot be assessed due to lack of information.
- **T0:** No evidence of a primary tumor.
- **NX:** Regional lymph nodes cannot be assessed due to lack of information.

## Other prognostic factors

The prognosis (the outlook for chances of survival) after treatment of a thymus cancer depends to a large extent on its stage. But other features are also important such as the type of thymus cancer (as described in [What Is Thymus Cancer?](#)<sup>4</sup>) and whether the surgeon is able to remove the entire tumor.

## Hyperlinks

1. [www.cancer.org/cancer/thymus-cancer/treating.html](http://www.cancer.org/cancer/thymus-cancer/treating.html)
2. [www.cancer.org/treatment/understanding-your-diagnosis/staging.html](http://www.cancer.org/treatment/understanding-your-diagnosis/staging.html)
3. [www.cancer.org/cancer/thymus-cancer/treating/surgery.html](http://www.cancer.org/cancer/thymus-cancer/treating/surgery.html)
4. [www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html](http://www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html)

## References

See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Survival Rates for Thymus Cancer

Survival rates can give you an idea of what percentage of people with the same type and stage of cancer are still alive a certain amount of time (usually 5 years) after they were diagnosed. They can't tell you how long you will live, but they may help give you a better understanding of how likely it is that your treatment will be successful.

**Keep in mind that survival rates are estimates and are often based on previous outcomes of large numbers of people who had a specific cancer, but they can't predict what will happen in any particular person's case. These statistics can be confusing and may lead you to have more questions. Talk with your doctor about how these numbers may apply to you, as he or she is familiar with your situation.**

## What is a 5-year relative survival rate?

A **relative survival rate** compares people with the same type and stage of thymus cancer to people in the overall population. For example, if the **5-year relative survival rate** for a specific stage of thymus cancer is 80%, it means that people who have that cancer are, on average, about 80% as likely as people who don't have that cancer to live for at least 5 years after being diagnosed.

## Where do these numbers come from?

The American Cancer Society relies on information from the SEER\* database, maintained by the National Cancer Institute (NCI), to provide survival statistics for different types of cancer.

The SEER database tracks 5-year relative survival rates for thymus cancer in the United States, based on how far the cancer has spread. The SEER database, however, does not group cancers by [AJCC TNM stages](#) (stage 1, stage 2, stage 3, etc.). Instead, it



groups cancers into localized, regional, and distant stages:

- **Localized:** There is no sign that the cancer has spread outside of the thymus.
- **Regional:** The cancer has spread outside of the thymus to nearby structures or lymph nodes.
- **Distant:** The cancer has spread to distant parts of the body such as the lining of the heart or the inside of the lungs.

### 5-year relative survival rates for thymus cancer

(Based on people diagnosed with thymus cancer between 2008 and 2014.)

SEER Stage	5-Year Relative Survival Rate
Localized	88%
Regional	77%
Distant	45%
All SEER stages combined	70%

### Understanding the numbers

- **These numbers apply only to the stage of the cancer when it is first diagnosed.** They do not apply later on if the cancer grows, spreads, or comes back after treatment.
- **These numbers don't take everything into account.** Survival rates are grouped based on how far the cancer has spread, but your age, overall health, [type of thymus cancer](#)<sup>1</sup>, [whether the entire cancer can be removed](#)<sup>2</sup>, how well the cancer responds to treatment, and other factors can also affect your outlook.
- **People now being diagnosed with thymus cancer may have a better outlook than these numbers show.** Treatments improve over time, and these numbers are based on people who were diagnosed and treated at least five years earlier.

\*SEER= Surveillance, Epidemiology, and End Results

### Hyperlinks

1. [www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html](http://www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html)
2. [www.cancer.org/cancer/thymus-cancer/treating/surgery.html](http://www.cancer.org/cancer/thymus-cancer/treating/surgery.html)

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See all references for Thymus Cancer ([www.cancer.org/cancer/thymus-cancer/references.html](http://www.cancer.org/cancer/thymus-cancer/references.html))

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# Questions to Ask Your Doctor About Thymus Cancer

It's important to have frank, open discussions with your cancer care team. They want to answer all of your questions, no matter how minor they might seem. Here are some questions you might want to ask:

- What [kind of thymic tumor](#)<sup>1</sup> do I have?
- Is it cancer?
- Has the cancer spread beyond the thymus?
- What is the [stage \(extent\) of my cancer](#), and what does that mean in my case?
- Can the tumor be removed with [surgery](#)<sup>2</sup>? (Is it likely to be resectable?)
- Are there other tests that need to be done before we can decide on treatment?
- How much experience do you have treating this type of cancer?
- Should I get a [second opinion](#)<sup>3</sup>?
- What [treatment choices](#)<sup>4</sup> do I have? What do you recommend? Why?
- What's the goal of treatment?

- What risks or side effects are there to the treatments you suggest?
- What should I do to be ready for treatment?
- How long will treatment last? What will it involve? Where will it be done?
- How will treatment affect my daily activities?
- What are the chances my cancer will recur (come back) with these treatment plans?
- What would we do if the treatment doesn't work or if the cancer recurs?
- What type of follow-up might I need [after treatment](#)<sup>5</sup>?

Along with these questions, be sure to write down some of your own. For instance, you might want to know more about recovery times so you can plan your work schedule. Or you may want to ask about [clinical trials](#)<sup>6</sup>.

Keep in mind, too, that doctors are not the only ones who can give you information. Other health care professionals, such as nurses and social workers, may have the answers to your questions. You can find more information about working with your health care team in [The Doctor-Patient Relationship](#)<sup>7</sup>.

## Hyperlinks

1. [www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html](http://www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html)
2. [www.cancer.org/cancer/thymus-cancer/treating/surgery.html](http://www.cancer.org/cancer/thymus-cancer/treating/surgery.html)
3. [www.cancer.org/treatment/finding-and-paying-for-treatment/choosing-your-treatment-team/seeking-a-second-opinion.html](http://www.cancer.org/treatment/finding-and-paying-for-treatment/choosing-your-treatment-team/seeking-a-second-opinion.html)
4. [www.cancer.org/cancer/thymus-cancer/treating.html](http://www.cancer.org/cancer/thymus-cancer/treating.html)
5. [www.cancer.org/cancer/thymus-cancer/after-treatment.html](http://www.cancer.org/cancer/thymus-cancer/after-treatment.html)
6. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)
7. [www.cancer.org/treatment/understanding-your-diagnosis/talking-about-cancer/the-doctor-patient-relationship.html](http://www.cancer.org/treatment/understanding-your-diagnosis/talking-about-cancer/the-doctor-patient-relationship.html)

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## Treating Thymus Cancer

If you've been diagnosed with thymus cancer, your cancer care team will discuss your treatment options with you. It's important to weigh the benefits of each treatment option against the possible risks and side effects.

### How is thymus cancer treated?

The main treatments for thymus cancer are:

- [Surgery for Thymus Cancer](#)
- [Radiation Therapy for Thymus Cancer](#)
- [Chemotherapy for Thymus Cancer](#)

### Common treatment approaches

Factors important in choosing a treatment include the [type](#)<sup>1</sup> and [stage](#)<sup>2</sup> of the cancer, whether or not it is resectable (able to be completely removed with surgery), and whether you have any other serious medical problems.

Because thymic cancer is rare, it's been hard to do large studies looking at treatments and comparing one against another. That's why in many cases the best way to treat this cancer is not always clear.

- [Treatment of Thymus Cancers by Extent and Type of Tumor](#)

### Who treats thymus cancer?

Your health care team may include:

- **Thoracic surgeon:** a surgeon who specializes in chest surgery

- **Radiation oncologist:** a doctor who treats cancer with radiation therapy
- **Medical oncologist:** a doctor who treats cancer with medicines such as chemotherapy
- **Pulmonologist:** a doctor who treats diseases of the lungs
- **Neurologist:** a doctor who diagnoses and treats brain and nervous system diseases

Many other specialists may be involved in your care as well, such as nurse practitioners, nurses, psychologists, social workers, rehabilitation specialists, and other health professionals.

- [Health Professionals Associated With Cancer Care<sup>3</sup>](#)

### **Making treatment decisions**

It's important to discuss all of your treatment options as well as their possible side effects with your family and your treatment team to make the choice that best fits your needs. If there's anything you don't understand, ask to have it explained.

If time permits, it is often a good idea to seek a second opinion. A second opinion can give you more information and help you feel more confident about the treatment plan you choose.

- [Questions to Ask Your Doctor About Thymus Cancer<sup>4</sup>](#)
- [Seeking a Second Opinion<sup>5</sup>](#)

### **Thinking about taking part in a clinical trial**

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-the-art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they're not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials.

- [Clinical Trials<sup>6</sup>](#)

## Considering complementary and alternative methods

You may hear about alternative or complementary methods that your doctor hasn't mentioned to treat your cancer or relieve symptoms. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used along with your regular medical care. Alternative treatments are used instead of a doctor's medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be harmful.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision.

- [Complementary and Alternative Medicine](#)<sup>7</sup>

## Help getting through cancer treatment

Your cancer care team will be your first source of information and support, but there are other resources for help when you need it. Hospital- or clinic-based support services are an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

The American Cancer Society also has programs and services – including rides to treatment, lodging, and more – to help you get through treatment. Call our National Cancer Information Center at 1-800-227-2345 and speak with one of our trained specialists.

- [Find Support Programs and Services in Your Area](#)<sup>8</sup>

## Choosing to stop treatment or choosing no treatment at all

For some people, when treatments have been tried and are no longer controlling the cancer, it could be time to weigh the benefits and risks of continuing to try new treatments. Whether or not you continue treatment, there are still things you can do to help maintain or improve your quality of life.

Some people, especially if the cancer is advanced, might not want to be treated at all. There are many reasons you might decide not to get cancer treatment, but it's important

to talk to your doctors and you make that decision. Remember that even if you choose not to treat the cancer, you can still get supportive care to help with pain or other symptoms.

- [If Cancer Treatments Stop Working](#)<sup>9</sup>
- [Palliative or Supportive Care](#)<sup>10</sup>

*The treatment information given here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.*

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## Surgery for Thymus Cancer

Whenever possible, surgery is used to treat thymus cancers. If you have thymus cancer, one of the first things your doctor will do is to try to figure out if the cancer is completely resectable (removable) with surgery. [Imaging tests](#)<sup>1</sup> are used to do this.

The most common surgery for thymus tumors is complete removal of the thymus gland (including any tumor). This is called a *thymectomy*. In most cases the surgery is done through a *median sternotomy*. This is an incision (cut) down the middle of the chest that splits the sternum (breast bone) and allows the whole thymus and tumor to be removed.

The surgeon will also try to remove any areas of tumor spread outside of the thymus. So, if the tumor has grown into nearby structures, the surgeon may need to remove parts of those structures, as well. This could mean removing parts of the pleura (tissue coating the lung), pericardium (the sac containing the heart), nerves, the superior vena cava (a large vein leading to the heart), and/or lung.

Some doctors might suggest surgery even if the tumor cannot be completely removed, as is the case with many [stage III thymomas](#)<sup>2</sup> and with most [stage IV thymomas](#)<sup>3</sup>. In these cases, the doctor might take out as much tumor as possible (called *debulking*), and then recommend further treatment with [radiation therapy](#) and/or [chemotherapy](#). But not all doctors agree that surgery to remove some and not all of the cancer can help people live longer. In some cases, chemotherapy may be given before surgery to try to



shrink the tumor so that it can be more easily and completely removed.

## Possible side effects of surgery for thymus cancer

Possible complications depend on the extent of the surgery and your health beforehand. Serious problems can include excessive bleeding, wound infections, and pneumonia.

You will need to stay in the hospital for several days after surgery. Because the surgeon usually will have to open your chest for the operation, the incision will hurt for some time after surgery. Your activity will be limited for at least a month or two.

Some people may need to have part or all of a lung removed. If your lungs are in good condition (other than the presence of the cancer) you can usually go back to normal activities after a lobe or even an entire lung has been removed. If you already have lung problems such as [emphysema or chronic bronchitis](#)<sup>4</sup> (which are common among heavy smokers), you may become short of breath with activities after surgery.

For more general information about surgery, see [Cancer Surgery](#)<sup>5</sup>.

## Hyperlinks

1. [www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/how-diagnosed.html](http://www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/how-diagnosed.html)
2. [www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html](http://www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html)
3. [www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html](http://www.cancer.org/cancer/thymus-cancer/detection-diagnosis-staging/staging.html)
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5. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html)

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## Radiation Therapy for Thymus Cancer

Radiation therapy is the use of high-energy radiation in the form of x-rays or radioactive particles to kill cancer cells.

Radiation therapy can be used in many ways:

- Radiation is often used after surgery if the doctor thinks that some cancer was left behind.
- Even when no visible tumor was left after [surgery](#), radiation therapy is sometimes given to try to kill any small areas of cancer that may have been left behind because they were too small to see. This is called *adjuvant therapy*. It's done for nearly all stage II, III, and IV thymomas and for most thymic carcinomas.
- Some patients who can't have surgery are treated with radiation therapy alone, but this doesn't work as well as surgery. Sometimes [chemotherapy](#) is given with radiation to help it work better.
- For people with advanced disease, radiation therapy can sometimes help ease (palliate) symptoms from the cancer such as shortness of breath, pain, bleeding, or trouble swallowing.

The type of radiation therapy used most often to treat thymic cancer is **external beam radiation therapy (EBRT)**. This type of radiation therapy uses x-rays from a machine outside the patient's body to kill cancer cells. The treatment is much like getting an x-ray, but the radiation is more intense. The procedure doesn't hurt, but it does cause side effects (discussed later on). Before your treatments start, the medical team will take careful measurements to determine the correct angles for aiming the radiation beams and the proper dose of radiation. They will also do special CT scans to help plan your treatments. Each treatment lasts only a few minutes, although the setup time — getting you into place for treatment — usually takes longer. Most often, radiation treatments are given 5 days a week for several weeks.

**A type of EBRT called *three-dimensional conformal radiation therapy (3D-CRT)* is used to treat thymic cancers.** This technique allows doctors to more accurately target the tumor while reducing the radiation damage to nearby healthy tissues such as the lungs and the heart.

An advanced form of 3D-CRT, called *intensity-modulated radiation therapy (IMRT)* is often used. It uses a computer-driven machine that moves around the patient as it delivers radiation. Along with shaping the radiation beams and aiming them at the tumor from several angles, the intensity (strength) of the beams can be adjusted to minimize the dose reaching the most sensitive normal tissues. This might offer a better chance of increasing the success rate and reducing side effects.

## **Possible side effects of radiation therapy for thymus cancer**

Common side effects of radiation therapy include:

- Fatigue
- Skin changes where the radiation passes through, such as redness and blistering
- Nausea and vomiting
- Irritation of the esophagus (the tube between the mouth and stomach), which could cause painful swallowing and eating problems
- Poor appetite and weight loss
- Diarrhea (if the abdomen/belly or pelvis is treated).

Radiation can damage bone marrow leading to low blood counts. This can lead to anemia (low red blood cell counts) which can cause people to feel weak and tired. It can also lead to low white blood cell counts, which increases the risk of serious infections.

Chest radiation therapy can also damage lungs. This can lead to trouble breathing and shortness of breath. This usually gets better after radiation treatments stop, but sometimes the damage is long-term (or even permanent).

Most side effects are short-term and get better over time after radiation treatment is done.

If radiation therapy is given along with chemotherapy, the side effects are often worse.

If you are having any side effects from radiation therapy, tell your doctor or nurse. In most cases there are ways to help control these symptoms.

## More information about radiation therapy

To learn more about how radiation is used to treat cancer, see [Radiation Therapy](#)<sup>1</sup>.

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)<sup>2</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)

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# Chemotherapy for Thymus Cancer

Chemotherapy (chemo) uses anti-cancer drugs that are given intravenously (IV or into a

vein), as an injection (shot), or by mouth. These drugs enter the bloodstream and reach the whole body, making this treatment useful for cancer that may have spread to organs beyond the thymus.

Chemo may be used in these situations:

- It may be given after surgery to try to kill any cancer cells that may have been left behind because they were too small to see. This is called *adjuvant* treatment.
- It may be given before surgery to try to shrink tumors so that they can be completely removed. This is called *neoadjuvant* therapy.
- Chemo may be the main treatment for people who have advanced cancer or are not healthy enough for surgery. .
- Chemo is sometimes combined with [radiation](#) to help it work better. This is known as *chemoradiation* or *chemoradiotherapy*.

Doctors give chemo in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Chemo cycles generally last about 3 to 4 weeks, and treatment typically involves 4 to 6 cycles. Chemo is often not recommended for people in poor health, but advanced age by itself is not a barrier to getting chemo.

Several chemo drugs may be used in the treatment of thymomas and thymic carcinomas, including:

- Doxorubicin (Adriamycin<sup>®</sup>)
- Cisplatin
- Carboplatin
- Cyclophosphamide (Cytosan<sup>®</sup>)
- Ifosfamide (Ifex<sup>®</sup>)
- Vincristine (Oncovin<sup>®</sup>)
- Etoposide (VP-16)
- Paclitaxel (Taxol<sup>®</sup>)
- Pemetrexed (Alimta<sup>®</sup>)
- 5-fluorouracil (5-FU)
- Gemcitabine (Gemzar<sup>®</sup>)

The corticosteroid drug prednisone is often given with chemo.

These drugs are usually given in combination to try to increase their effectiveness. For example, the combination of cisplatin, doxorubicin, and cyclophosphamide (called CAP)

with or without prednisone is often used to treat thymoma. The combination of carboplatin and paclitaxel may be used to treat thymic carcinoma.

## Possible side effects of chemotherapy for thymus cancer

Chemo drugs work by attacking cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow, the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemo, which can lead to certain side effects.

The side effects of chemo depend on the type and dose of drugs you are given and how long they are used. Side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Fatigue and weakness

Chemo can also affect the blood forming cells of the bone marrow, leading to:

- Increased chance of infections (due to low white blood cell counts)
- Easy bruising or bleeding (due to low blood platelet counts)
- Fatigue and weakness (due to low red blood cell counts)

Side effects usually go away over time after treatment ends and there are often ways to lessen them. For instance, drugs can be used to help prevent or reduce nausea and vomiting. If you do have side effects, be sure to ask your doctor or nurse about medicines to help reduce or manage them.

Some drugs can have other side effects. For example, cisplatin and paclitaxel can damage nerves (called *neuropathy*). This can sometimes lead to pain, burning or tingling sensations, sensitivity to cold or heat, or weakness in the hands and feet. Cisplatin can also affect the nerves of the ear, leading to hearing loss. In most cases these problems improve or even go away once treatment is stopped, but they may last a long time in some people. You should report this, as well as any other side effects or changes you notice while getting chemotherapy, to your medical team so that you can get prompt treatment for them. In some cases, the doses of the chemotherapy drugs may need to be reduced or treatment may need to be delayed or stopped to keep the effects from getting worse.

## Octreotide

A drug called *octreotide* (Sandostatin<sup>®</sup> and Sandostatin LAR<sup>®</sup>) may also help some people with advanced thymoma. This is not a typical chemo drug. It's a man-made version of a hormone called *somatostatin*. The drug works in some cases because it attaches to the thymoma cells and causes them to stop growing or die. Side effects of this drug can include pain or burning at the injection site, stomach cramps, nausea, vomiting, headaches, dizziness, and fatigue. It is also linked to increased risk of gallstones.

## More information about chemotherapy

To learn more about how chemotherapy is used to treat cancer, see [Chemotherapy](#)<sup>1</sup>.

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)<sup>2</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html)

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Novartis Pharmaceuticals Corporation. Sandostatin<sup>®</sup> LAR Depot package insert. Revised: 7/2016. Accessed 10/3/17 at [www.pharma.us.novartis.com/sites/www.pharma.us.novartis.com/files/sandostatin\\_lar.pdf](http://www.pharma.us.novartis.com/sites/www.pharma.us.novartis.com/files/sandostatin_lar.pdf).

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## Treatment of Thymus Cancers by Extent and Type of Tumor

Whether or not a thymus cancer is considered resectable (able to be removed with [surgery](#)) is one of the most important factors in determining treatment options. The [type](#)<sup>1</sup> of tumor is also important. Thymic carcinomas are more likely to grow and spread quickly than thymomas and often require more aggressive treatment.

### Resectable cancers

For people with resectable cancers (almost all stage I and II thymus cancers, most stage III cancers, and small number of stage IV cancers), surgery offers the best chance for long-term survival. Surgery includes removing the entire thymus and, depending on the extent of the disease, maybe parts of nearby organs or blood vessels, too.

Early stage thymomas (such as stage I and II) don't usually need more treatment after surgery as long as the tumor was removed completely. In some cases, [radiation therapy](#) may be considered if there is concern that any tumor was left behind.

Patients with more advanced stage thymomas (such as stages III and IV) may be treated with radiation after surgery, even if all of the tumor was removed. If the tumor couldn't be removed completely, radiation therapy is usually given after surgery. Depending on how much cancer was left behind, [chemotherapy](#) (chemo) may be added as well.

Thymic carcinomas are more likely than thymomas to come back after treatment. Patients with stage I tumors may not need further treatment if the tumor was removed completely. If the tumor is more advanced, or some might have been left behind, patients are typically treated with radiation after surgery. The radiation may be given along with chemo, especially if some of the cancer is left behind after surgery.



## Unresectable cancers

Unresectable cancers are those that cannot be removed with [surgery](#). This group includes cancers that are too close to vital structures (like nerves and blood vessels) or that have spread too far to be removed completely (which includes many stage III and most stage IV cancers). It also includes people who are too ill for surgery.

In some cases, doctors may advise giving [chemo](#) first to try to make the tumor resectable. If it shrinks enough, surgery is done. This is then followed by further treatment with chemo or radiation therapy.

Surgery may be the first treatment for some unresectable cancers, to try to remove as much of the tumor as possible. This is called *debulking*. Radiation therapy and/or chemo are then given. The hope is that the surgery may help the other treatments work better and may help people live longer, even if it doesn't cure the cancer. Studies of this approach have had mixed results.

For patients who can't have surgery, either because the cancer has spread too far or because they're too sick from other serious medical conditions, chemo and radiation therapy are the main treatment options.

Because unresectable cancers can be hard to treat, taking part in a [clinical trial](#)<sup>2</sup> of a newer form of treatment may be a reasonable option.

## Recurrent thymus cancer

When cancer comes back after treatment it's called *recurrent*. Recurrence can be local (in or near the same place it started) or distant (spread to organs such as the lungs, liver, or bone).

Thymomas most often come back locally. Thymic carcinomas can also come back locally and in nearby lymph nodes, but they may also spread to liver, lungs, and bone.

Treatment for thymus cancer that has recurred (come back) after initial treatment depends on the location of the recurrence and on what the original treatment was. If the recurrence is not too widespread, [surgery](#) may be an option and would offer the best chance for long-term survival. But in most cases, the treatment options are limited to radiation therapy and/or chemo. These treatments can often help control the cancer for a time, but they are very unlikely to result in a cure.

Because recurrent cancers can be hard to treat, [clinical trials](#)<sup>3</sup> of new types of treatment

may be a good option.

## Hyperlinks

1. [www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html](http://www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)
3. [www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html](http://www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html)

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# After Thymus Cancer Treatment

## Living as a Cancer Survivor

For many people, ending cancer treatment often raises questions about next steps as a survivor.

- [Living as a Thymus Cancer Survivor](#)

## Cancer Concerns After Treatment

Treatment may remove or destroy the cancer, but it's very common to have questions about cancer coming back or treatment no longer working.

- [Second Cancers After Thymus Cancer](#)

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# Living as a Thymus Cancer Survivor

For most people with thymus cancer, treatment can remove or destroy the cancer. The end of treatment can be both stressful and exciting. You may be relieved to finish treatment, but yet it's hard not to worry about cancer coming back. This is very common if you've had cancer.

For other people, the cancer might never go away completely. Some people may get regular treatment with chemotherapy or targeted therapy or other treatments to try and help keep the cancer in check. Learning to live with cancer that does not go away can

be difficult and very stressful.

Life after cancer means returning to some familiar things and also making some new choices.

## **Follow-up care**

When treatment ends, your doctors will still want to watch you closely. It is very important to go to all of your follow-up appointments. During these visits, your doctors will ask questions about any problems you may have and may do exams and lab tests or x-rays and scans to look for signs of cancer or treatment side effects. Almost any cancer treatment can have side effects. Some may last for a few weeks to months, but others can last the rest of your life. This is the time for you to talk to your cancer care team about any changes or problems you notice and any questions or concerns you have.

There is no widely agreed upon follow-up schedule for people with thymus cancer. Your doctor will most likely want to see you fairly frequently (every couple of months or so) at first. The time between visits may be extended if there are no problems. Most patients get a chest CT scan every six months for a couple of years, then yearly for 5 to 10 years.

## **Ask your doctor for a survivorship care plan**

Talk with your doctor about developing a survivorship care plan for you. This plan might include:

- A suggested schedule for follow-up exams and tests
- A schedule for other tests you might need in the future, such as early detection (screening) tests for other types of cancer, or tests to look for long-term health effects from your cancer or its treatment
- A list of possible late- or long-term side effects from your treatment, including what to watch for and when you should contact your doctor
- Diet and physical activity suggestions
- Reminders to keep your appointments with your primary care provider (PCP), who will monitor your general health care

## **Keeping health insurance and copies of your medical records**

Even after treatment, it's very important to keep health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

At some point after your cancer treatment, you might find yourself seeing a new doctor who doesn't know about your medical history. It's important to keep copies of your medical records to give your new doctor the details of your diagnosis and treatment. Learn more in [Keeping Copies of Important Medical Records](#)<sup>1</sup>.

## **Can I lower my risk of the thymus cancer progressing or coming back?**

If you have (or have had) thymus cancer, you probably want to know if there are things you can do that might lower your risk of the cancer growing or coming back, such as exercising, eating a certain type of diet, or taking nutritional supplements. Unfortunately, it's not yet clear if there are things you can do that will help.

Adopting healthy behaviors such as [not smoking](#)<sup>2</sup>, [eating well](#)<sup>3</sup>, [getting regular physical activity](#)<sup>4</sup>, and [staying at a healthy weight](#)<sup>5</sup> might help, but no one knows for sure. However, we do know that these types of changes can have positive effects on your health that can extend beyond your risk of thymus cancer or other cancers.

### **About dietary supplements**

So far, no [dietary supplements](#)<sup>6</sup> (including vitamins, minerals, and herbal products) have been shown to clearly help lower the risk of thymus cancer progressing or coming back. This doesn't mean that no supplements will help, but it's important to know that none have been proven to do so.

Dietary supplements are not regulated like medicines in the United States – they do not have to be proven effective (or even safe) before being sold, although there are limits on what they're allowed to claim they can do. If you're thinking about taking any type of nutritional supplement, talk to your health care team. They can help you decide which ones you can use safely while avoiding those that might be harmful.

### **If the cancer comes back**

If the cancer does recur at some point, your treatment options will depend on where the cancer is located, what treatments you've had before, and your health. For more information on how recurrent cancer is treated, see [Treatment of Thymus Cancer by Extent and Type of Tumor](#)<sup>7</sup>.

For more general information on recurrence, you may also want to see [Understanding Recurrence](#)<sup>8</sup>.

## Could I get a second cancer after treatment?

People who've had thymus cancer can still get other cancers. In fact, thymus cancer survivors are at higher risk for getting some other types of cancer. Learn more in [Second Cancers After Thymus Cancer](#).

## Getting emotional support

Some amount of feeling depressed, anxious, or worried is normal when cancer is a part of your life. Some people are affected more than others. But everyone can benefit from help and support from other people, whether friends and family, religious groups, support groups, professional counselors, or others. Learn more in [Life After Cancer](#)<sup>9</sup>.

## Hyperlinks

1. [www.cancer.org/treatment/survivorship-during-and-after-treatment/be-healthy-after-treatment/keeping-copies-of-important-medical-records.html](http://www.cancer.org/treatment/survivorship-during-and-after-treatment/be-healthy-after-treatment/keeping-copies-of-important-medical-records.html)
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8. [www.cancer.org/treatment/survivorship-during-and-after-treatment/understanding-recurrence.html](http://www.cancer.org/treatment/survivorship-during-and-after-treatment/understanding-recurrence.html)
9. [www.cancer.org/treatment/survivorship-during-and-after-treatment/be-healthy-after-treatment/life-after-cancer.html](http://www.cancer.org/treatment/survivorship-during-and-after-treatment/be-healthy-after-treatment/life-after-cancer.html)

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# Second Cancers After Thymus Cancer

Cancer survivors can be affected by a number of health problems, but often their greatest concern is facing cancer again. If a cancer comes back after treatment it is called a “recurrence.” But some cancer survivors may develop a new, unrelated cancer later. This is called a “second cancer.” No matter what type of cancer you have had, it is still possible to get another (new) cancer, even after surviving the first.

Unfortunately, being treated for cancer doesn’t mean you can’t get another cancer. People who have had cancer can still get the same types of cancers that other people get. In fact, certain types of cancer and cancer treatments can be linked to a higher risk of certain second cancers.

Survivors of thymus cancer can get any type of second cancer, but they have an increased risk of:

- [Non-Hodgkin lymphoma](#)<sup>1</sup>
- [Salivary gland cancer](#)<sup>2</sup>
- [Liver cancer](#)<sup>3</sup>
- [Soft-tissue sarcoma](#)<sup>4</sup>

## Follow-up after treatment

After completing treatment for thymus cancer, you should still see your doctor regularly. You may have tests to look for signs the cancer has come back or spread. Experts do not recommend any additional testing to look for second cancers in patients without symptoms. Let your doctor know about any new symptoms or problems, because they could be caused by the cancer coming back or by a new disease or second cancer.

Survivors of thymus cancer should follow the [American Cancer Society guidelines for the early detection of cancer](#)<sup>5</sup> and [stay away from tobacco products](#)<sup>6</sup>. Smoking increases the risk of many cancers.

To help maintain good health, survivors should also:

- Achieve and maintain a [healthy weight](#)<sup>7</sup>
- Adopt a [physically active lifestyle](#)<sup>8</sup>
- Consume a [healthy diet](#)<sup>9</sup>, with an emphasis on plant foods
- Limit consumption of [alcohol](#)<sup>10</sup> to no more than 1 drink per day for women or 2 per

day for men

These steps may also lower the risk of some cancers.

See [Second Cancers in Adults](#)<sup>11</sup> for more information about causes of second cancers.

## Hyperlinks

1. [www.cancer.org/cancer/non-hodgkin-lymphoma.html](http://www.cancer.org/cancer/non-hodgkin-lymphoma.html)
2. [www.cancer.org/cancer/salivary-gland-cancer.html](http://www.cancer.org/cancer/salivary-gland-cancer.html)
3. [www.cancer.org/cancer/liver-cancer.html](http://www.cancer.org/cancer/liver-cancer.html)
4. [www.cancer.org/cancer/soft-tissue-sarcoma.html](http://www.cancer.org/cancer/soft-tissue-sarcoma.html)
5. [www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines.html](http://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines.html)
6. [www.cancer.org/healthy/stay-away-from-tobacco.html](http://www.cancer.org/healthy/stay-away-from-tobacco.html)
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