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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](#)

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)

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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 thymomas. 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

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

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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](#)¹ may be the first imaging test a doctor orders if they suspect 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](#)² 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](#)³ 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](#)⁴, 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](#)⁵ 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](#)⁶ 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
2. 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
4. www.cancer.org/treatment/understanding-your-diagnosis/tests/nuclear-medicine-scans-for-cancer.html
5. 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

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)

Last Revised: October 4, 2017

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](#)¹. 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](#)².

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](#)³ 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?](#)⁴) and whether the surgeon is able to remove the entire tumor.

Hyperlinks

1. www.cancer.org/cancer/thymus-cancer/treating.html
2. www.cancer.org/treatment/understanding-your-diagnosis/staging.html
3. www.cancer.org/cancer/thymus-cancer/treating/surgery.html
4. 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)

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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. Your doctor is familiar with your situation; ask how these numbers may apply to you.

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 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 lungs.

5-year relative survival rates for thymus cancer

These numbers are based on people diagnosed with thymus cancer between 2011 and 2017.

SEER Stage	5-Year Relative Survival Rate
Localized	95%
Regional	78%
Distant	38%
All SEER stages combined	71%

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](#)¹, [whether the entire cancer can be removed](#)², 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
2. www.cancer.org/cancer/thymus-cancer/treating/surgery.html

References

SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2021 September 27]. Available from <https://seer.cancer.gov/explorer/>.

Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER Research Data, 18 Registries, Nov 2020 Sub (2000-2018) - Linked To County Attributes - Time Dependent (1990-2018) Income/Rurality, 1969-2019 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2021, based on the November 2020 submission.

See all references for Thymus Cancer (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](#)¹ 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](#)²? (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](#)³?
- What [treatment choices](#)⁴ 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](#)⁵?

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](#)⁶.

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](#)⁷.

Hyperlinks

1. www.cancer.org/cancer/thymus-cancer/about/what-is-thymus-cancer.html
2. www.cancer.org/cancer/thymus-cancer/treating/surgery.html
3. www.cancer.org/treatment/treatments-and-side-effects/choosing-your-treatment-team/seeking-a-second-opinion.html
4. www.cancer.org/cancer/thymus-cancer/treating.html
5. www.cancer.org/cancer/thymus-cancer/after-treatment.html
6. www.cancer.org/treatment/treatments-and-side-effects/clinical-trials.html
7. www.cancer.org/treatment/treatments-and-side-effects/choosing-your-treatment-team/the-doctor-patient-relationship.html

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

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