Early Detection, Diagnosis, and Staging

Detection and Diagnosis

Catching cancer early 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
- How Is Thymus Cancer Diagnosed?

Stages and Outlook (Prognosis)

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

- How Is Thymus Cancer Staged?
- Survival Rates for Thymus Cancer

Questions to Ask About Thymus Cancer

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

- What Should You 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.

Acceptable references:

- References

See all references for Thymus Cancer

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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
See all references for Thymus Cancer

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you about symptoms and use one or more exams or tests to find out if the disease is really present. Certain signs and symptoms might suggest that a person may have a thymus tumor, but tests are needed to confirm the diagnosis.

**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 because the patient has signs and symptoms associated with myasthenia gravis, hypogammaglobulinemia, or red cell aplasia.

If symptoms and/or the results of the physical exam suggest a thymus tumor might be present, more tests probably will be done. These might include imaging tests, lab tests, and other procedures.

**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 cancerous, to learn how far cancer may have spread, and to help determine if treatment has been effective.

**Chest x-ray**

A chest x-ray 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 in people before they cause any symptoms (when the person is having the x-ray done for another reason). However, some thymomas are small or are in certain places that may not show up on a chest x-ray. If your doctor is still suspicious or if an abnormality appears on the chest x-ray, a CT scan may be ordered.

**Computed tomography (CT) scan**
The computed tomography (CT) scan is an x-ray procedure that produces detailed cross-sectional images of your body. Instead of taking one picture, like a regular x-ray, a CT scanner takes many pictures as it rotates around you while you are lying on a narrow platform. A computer then combines these into images of slices of the part of your body that is being studied.

Before the test, you may be asked to drink 1 to 2 pints of a liquid called oral contrast. This helps outline abnormal areas in the body. You may also receive an IV line through which a different kind of contrast dye (IV contrast) is injected. This helps better outline structures such as blood vessels in your body.

The injection can cause some flushing (redness and warm feeling that may last hours to days). A few people are allergic to the dye and get hives. Rarely, more serious reactions like trouble breathing and low blood pressure can occur. Medicine can be given to prevent and treat allergic reactions. Be sure to tell the doctor if you have ever had a reaction to any contrast material used for x-rays.

A CT scanner has been described as a large donut, with a narrow table in the middle opening. You will need to lie still on the table while the scan is being done. CT scans take longer than regular x-rays, and you might feel a bit confined by the ring while the pictures are being taken.

CT scans can have several uses:

- CT scans of the chest can spot very small tumors and help determine the exact location and extent of the tumors.
- CT scans can be helpful in staging a cancer (determining the extent of its spread). For example, they can show whether the cancer has spread to nearby lymph nodes or to the liver, kidneys, brain, or other organs.
- CT scans can also be used to guide a biopsy needle precisely into a suspected tumor or metastasis. For this procedure, called a CT-guided needle biopsy, the patient remains on the CT scanning table while a radiologist advances a biopsy needle through the skin and toward the location of the mass. CT scans are repeated until the needle is within the mass. A biopsy sample is then removed and looked at under a microscope.
- During or after treatment, CT scans may be used to see whether tumors are shrinking or have recurred (come back) in other parts of the body.

**Magnetic resonance imaging (MRI) scan**
Like CT scans, MRI scans provide detailed images of soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of body tissue and by certain diseases. A computer translates the pattern into very detailed images of parts of the body. A contrast material called gadolinium is often injected into a vein before the scan to better see details.

MRI scans may be a little more uncomfortable than CT scans. They take longer — often up to an hour. You may be placed inside a large cylindrical tube, which is confining and can upset people with a fear of enclosed spaces (claustrophobia). For people who cannot tolerate a regular MRI machine, there are special, more open MRI machines that can be used instead in some cases. The MRI machine makes buzzing and clicking noises that you might find disturbing. Some places will provide earplugs to help block this out.

MRI of the chest may be done to look more closely at thymus tumors. They are most often used when the patient can't 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, you receive an injection of a substance that contains a radioactive atom. This is usually glucose (a type of sugar), but other substances that are attracted to thymoma cells may also be used. The amount of radioactivity is very low. The cancer cells in the body absorb large amounts of the radioactive substance. A special camera can then be used to create a picture of areas of radioactivity in the body. The picture is not finely detailed like a CT or MRI scan, but it can provide helpful information about your whole body.

A PET scan can help give the doctor a better idea of whether an abnormal area 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 appearance 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 directly, but they may still be helpful in some situations. For example, tests may be done to look for certain antibodies in the blood of people who may have myasthenia gravis or other autoimmune disorders. Other blood tests may 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 (MG) will be done before any surgery. This is because MG is very common in patients with a thymoma, and, if left untreated, it can cause problems with anesthesia during surgery. People getting chemotherapy also have regular blood tests to make sure the drugs aren’t having unwanted effects on the bone marrow, kidneys, or other organs.

Types of biopsy procedures

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

For most cancers, removal of a small sample 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. If the doctor suspects a different type of tumor, a biopsy may be done before surgery. Most often, a needle biopsy is done. A biopsy may also be done to confirm the diagnosis if the tumor can’t be removed completely with surgery. This can allow the cancer to be treated with things other than surgery.

Needle biopsy

Tumors in the chest are sometimes sampled by needle biopsy. A long, hollow needle is passed through the skin in the chest. Imaging tests such as CT scans are used to guide the needle into the tumor so that a small sample can be removed to be looked at under the microscope. This procedure is done without a surgical incision or overnight hospital stay.
A possible downside of this test is that it might not always get enough of a sample to make an accurate diagnosis or allow the doctor to get a good sense of the extent of the tumor.

**Surgical biopsy**

In most cases, if the doctor believes that the patient has thymoma (based on CT findings and lab tests, especially in a patient with a paraneoplastic syndrome) and it can be removed with surgery, the doctor may operate without any biopsy. This can both provide enough of a sample for a diagnosis and treat the tumor at the same time. The specimen is sent to the lab after surgery to confirm the diagnosis. See [Surgery For Thymus Cancer](#) for more information.

- References
  
  See all references for Thymus Cancer

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**How Is Thymus Cancer Staged?**

Staging is the process of finding out if and how far a cancer has spread. Your treatment and prognosis (the outlook for chances of survival) depend, to a large extent, on the cancer’s stage.

**Masaoka staging system**

There is no single staging system for thymomas that all doctors agree on, perhaps because these tumors are so uncommon. The system most often used to stage thymomas is the Masaoka system, although other systems exist. Staging in the Masaoka system is based on:

- The extent of disease as seen on imaging tests such as CT or MRI scans
- Whether the surgeon finds the tumor hard to separate from nearby tissues
Whether the doctor sees tumor cells beyond the thymus when looking at the tumor sample under the microscope

The Masaoka system has 4 main stages.

**Stage I**

The thymoma is non-invasive. That is, it has not spread into the capsule (outer layer) of the thymus.

**Stage II**, which is divided into IIA and IIB

- Stage IIA: The thymoma is growing into the capsule (the outer layer of tissue of the thymus).
- Stage IIB: The tumor has grown through the capsule into the nearby fatty tissue, and may be stuck to the mediastinal pleura (the thin layer covering the space between the 2 lungs) or the pericardium (the tissue sac containing the heart).

**Stage III**

The thymoma is growing into nearby tissues or organs of the lower neck or upper chest area, including the pericardium (the tissue sac containing the heart), the lungs, or the main blood vessels going into or exiting from the heart (the superior vena cava and aorta).

**Stage IV**, which is divided into IVA and IVB

- Stage IVA: The thymoma has spread widely throughout the pleura (lining of the lungs and chest wall) and/or pericardium.
- Stage IVB: The thymoma has spread to distant organs. The most common sites of spread are bone, the liver, and the lungs.

**Resectable versus unresectable cancer**

The Masaoka staging system divides thymomas into different groups that help give doctors an idea about a person’s prognosis (outlook). But for treatment purposes, doctors often use a simpler system based on whether these cancers are likely to be resectable (where all visible tumor can be removed by surgery) or unresectable.

In general terms, almost all stage I and II thymomas, most stage III thymomas, and
even some stage IV thymomas are potentially resectable, but there are exceptions. Resectability is based on whether the tumor appears to have grown into nearby tissues or spread to distant sites, as well as on whether or not a person is healthy enough to have surgery.

**Surgery** is typically part of the treatment plan whenever possible. In some cases, other forms of treatment such as **radiation therapy** or **chemotherapy** may be recommended as well.

### Other prognostic factors

The prognosis (the outlook for chances of survival) after treatment of a thymoma depends to a large extent on its stage. But other features are important as well, such as its cellular classification (described in **What Is Thymus Cancer?**) and whether the surgeon is able to remove the entire tumor.

- **References**
  
  See all references for Thymus Cancer

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### Survival Rates for Thymus Cancer

Survival rates are often used by doctors as a standard way of discussing a person’s prognosis (outlook). Some patients with cancer want to know the survival statistics for people in similar situations, while others may not find the numbers helpful, or may even not want to know them.

The 5-year survival rate refers to the percentage of patients who live **at least 5 years** after their cancer is diagnosed. Of course, many people live much longer than 5 years (and many are cured). Although many patients live much longer than this, it isn’t always an indication that the cancer has been cured, as some thymus tumors are very slow growing, and others may return in some people several years after treatment.
To get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. Treatment may have improved since then which could result in a more favorable outlook for people now being diagnosed with thymus cancer.

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they cannot predict what will happen in any particular person’s case. Many other factors may affect a person’s outlook, such as the histologic type of thymus cancer, the treatment received, whether it was completely removed with surgery, and the patient’s age. Your doctor can tell you how the numbers below may apply to you, as he or she is familiar with your particular situation.

Because thymus cancers are not common, it is hard to find accurate survival rates based on the stage of the cancer. The numbers below come from a large series of patients treated in Japan between 1990 and 1994. They look separately at patients with thymoma (types A, AB, and B) and thymic carcinoma (type C thymoma). Also, these are observed survival rates. People with thymus cancer can die of other things, and these numbers don’t take that into account.

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<td>II</td>
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<td>III</td>
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<td>IV</td>
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<table>
<thead>
<tr>
<th>Stage of thymic carcinoma</th>
<th>5-year observed survival rate</th>
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<tr>
<td>I and II</td>
<td>74%</td>
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<tr>
<td>III</td>
<td>33%</td>
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<td>IV</td>
<td>24%</td>
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References
See all references for Thymus Cancer
What Should You 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. For instance, consider these questions:

- What kind of thymic tumor do I have?
- Has my 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 (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?
- What treatment choices 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?

In addition to these questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your work schedule. Or you may want to ask about clinical trials for which you may qualify.

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 communicating with your health care team in The Doctor-Patient Relationship.

- References
- See all references for Thymus Cancer