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.

- What Are the Key Statistics About Thymus Cancers?
- What’s New in Research and Treatment for Thymus Cancer?

What Is Thymus Cancer?

Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer, and can spread to other areas of the body. To learn more about how cancers start and spread, see What Is Cancer?

Thymus cancers are uncommon. 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 known as 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 throat 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 and a surface that is made up of many small bumps called lobules. The thymus has 3 main layers:

- The medulla is the innermost part of the thymus.
- The cortex is the layer surrounding 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 slowly decreases in size during adulthood as it is gradually 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 has different types of cells, each of which 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 and non-Hodgkin lymphoma.
- 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 and Gastrointestinal Carcinoid Tumors 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-cancerous) thymomas and malignant (cancerous) thymomas, based on whether they had grown beyond the thymus into other tissues or organs. Now, most doctors think all thymomas are potentially cancerous, 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 appears 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 discussed in How Is Thymus Cancer Staged?

**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 appear to be 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 except that 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-appearing 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 consists 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 have a very abnormal appearance under the microscope. The cells may no longer even look like thymus cells. These tumors have often grown into (invaded) nearby tissues and/or metastasized (spread to distant tissues and organs) at the time they are found. This type of thymoma has the worst prognosis (outlook).

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, with type A having the best outlook, and type C having the worst. Still, for most types of thymoma, the **stage** (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), in the heart (and the tissue surrounding it), in the trachea, and in the lymph nodes (lymphoma).

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 can also develop in the mediastinum.
More often, cancer spreads there from other areas, especially the lungs.

- References
  See all references for Thymus Cancer

What Are the 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.

- References
  See all references for Thymus Cancer

What’s New in Research and Treatment for Thymus Cancer?

There is 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 relatively rare, more information from clinical trials is needed to decide which treatments are best for each type and stage. For example, the role of chemotherapy in treating thymomas is still being explored. In addition, new treatments are being developed and tested.

Researchers are looking for more accurate ways of predicting the aggressiveness of each tumor so that treatment can be more appropriately selected for each patient.

Some studies are looking to see if giving treatment with chemotherapy (chemo) and/or radiation before surgery can help patients with thymus cancer.

Removing or destroying all of the cancer cells is not the only consideration in treating patients with 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 is not always effective and can have serious side effects. Chemo drugs work by attacking rapidly 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 begun to develop drugs that target these differences. Studies are now testing targeted therapies against cancers of the thymus. 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, erlotinib, and bevacizumab. Others being studied, such as cixutumumab, milciclib and saracatinib are not yet approved to treat any type of cancer.

Octreotide is a non-chemo drug that can sometimes be helpful in treating thymus cancers. Pasireotide is a similar drug that is now being studied to see if it may be helpful, too.

- References

See all references for Thymus Cancer

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