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Could Your Thymus Be the Key to Fighting Cancer?

Analysis by Dr. Joseph Mercola | December 22, 2023

STORY AT-A-GLANCE

- Your thymus is a thyme leaf-shaped double-lobed organ located in the center of your chest, directly beneath your breastbone at the level of your heart
- The two types of cells that make up the thymus are reticular cells and lymphocytes, which include thymus-derived cells (T cells), thymus-independent lymphocytes (B cells) and natural killer cells (NK cells)
- The primary function of the thymus is to aid in the maturation process of T cells, which are in charge of determining your immune response to antigens
- Your thymus plays a crucial role in the the prevention of cancer. Recent research found patients who underwent thymectomy (surgical removal of the thymus) had a twofold higher risk of cancer five years post-surgery
- Common symptoms of low thymus function include susceptibility to the common cold and influenza, persistent chronic illnesses and fatigue, slow wound healing, and signs of premature or accelerated aging. Strategies to support and improve thymus function are included

Your thymus is a thyme leaf-shaped double-lobed organ located in the center of your chest, directly beneath your breastbone at the level of your heart. It's part of your lymphatic system. The outer layer is called the cortex and the inner area is called the medulla. The two types of cells that make up the thymus are:[1]

- **Reticular cells, a subtype of connective tissue**

- Lymphocytes, a type of white blood cells responsible for the specificity of your adaptive immune responses. Lymphocytes include thymus-derived cells (T cells), thymus-independent lymphocytes (B cells) and natural killer cells (NK cells)

Your Thymus — The Key to Immune Health

The primary function of the thymus is to aid in the maturation process of T cells, which are in charge of determining your immune response to antigens. Immature T cells produced by the bone marrow first migrate into the cortex of the thymus. Once there, they begin to differentiate and mature into functional T cells, which are your body's first line of defense against foreign invaders such as viruses.

The T cells either mature into helper T cells (CD4+) or NK cells (CD8+). T cells and B cells work synergistically to produce antibodies once a foreign pathogen has been detected. The lymphocytes reenter your bloodstream by migrating into the medulla, which has veins that connect it to the rest of the circulatory system.

As explained by Dr. J.E. Williams in an article[2] detailing the roles of your thymus, T cells are involved in all aspects of immunity, including:

Viral infections	The inflammatory cascade
Vaccination responses	Allergies
Autoimmunity	Gut dysbiosis
Metabolic dysfunction	Tissue repair
Maintaining a healthy pregnancy	

Your Thymus Is Crucial for Cancer Prevention

Your thymus is also crucial for the prevention of cancer, which makes sense considering your immune system is the first line of defense not only for viral infections but also cancer.[3]

Recent research[4] by scientists at Harvard and Massachusetts General Hospital bears this out, showing that patients who underwent thymectomy (surgical removal of the thymus) had a twofold higher risk of cancer five years post-surgery, and a nearly threefold higher risk of dying from any cause. As reported by the authors:[5]

> *"At 5 years after surgery, all-cause mortality was higher in the thymectomy group than in the control group (8.1% vs. 2.8%; relative risk, 2.9 ...), as was the risk of cancer (7.4% vs. 3.7%; relative risk, 2.0 ...).*
>
> *Although the risk of autoimmune disease did not differ substantially between the groups in the overall primary cohort (relative risk, 1.1 ...), a difference was found when patients with preoperative infection, cancer, or autoimmune disease were excluded from the analysis (12.3% vs. 7.9%; relative risk, 1.5 ...).*
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> *In an analysis involving all patients with more than 5 years of follow-up (with or without a matched control), all-cause mortality was higher in the thymectomy group than in the general U.S. population (9.0% vs. 5.2%), as was mortality due to cancer (2.3% vs. 1.5%).*
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> *In the subgroup of patients in whom T-cell production and plasma cytokine levels were measured ... those who had undergone thymectomy had less new production of CD4+ [helper T cells] and CD8+ [killer] lymphocytes than controls ... and higher levels of proinflammatory cytokines in the blood."*

According to Dr. David Scadden,[6] who led the investigation, the magnitude of the cancer risk post-thymectomy was entirely unexpected. "The primary reason why the thymus has an impact on overall health seems to be as a way to protect against the development of cancer," he told The Harvard Gazette.[7]

Routine Thymectomies Need To Be Reconsidered

For decades, scientists have believed the thymus was of little use in adulthood, as its size and activity dwindles right after puberty. While thymus cancer and myasthenia gravis (an autoimmune condition) are common causes for thymus removal, surgeons will often take it out during heart surgery as well.

Because of its location, it tends to get in the way when working on the heart, so removing it makes the surgeon's job easier. However, these new findings suggest that might be a bad idea, as it can significantly raise the patient's risk of cancer and premature death. As noted by Scadden, "This study demonstrates just how vital the thymus is to maintaining adult health."

Other Substances Produced by Your Thymus

Your thymus also produces several other substances that are important for immune health, including cytokines, which play a crucial role in the regulation of your immune function. As explained by Williams:[8]

> *"... too many cytokines trigger an immune storm sparking a hyperactive response that can cause death. That was the case in the first SARS coronavirus infections. Patients were overwhelmed by the virus and their immune systems overly aggressive response.*
>
> *Cytokine storms are common in older patients with COVID-19 coronaviral infections. But, a healthy, well-functioning thymus keeps the immune system in balance."*

Your thymus also produces:[9]

- Hormones, such as:
  - Thymosins, which stimulate the maturation of T cells and regulate aging
  - Thymopoietin, which modulates immune function

    - Thymulin, a zinc-dependent hormone that induces T cell differentiation and enhances the function of T cells and NK cells, among other things
- Peptides, smaller versions of proteins that are involved in cell signaling and cell function; some peptides also act as hormones
- Interleukins, immune-modulating molecules that influence the inflammatory response to infection and cancer

How's Your Thymus Function?

There's no direct way to assess the function of your thymus, but a T- and B-lymphocyte test can give you an idea. If one or both of these lymphocytes are low, your thymus is probably underperforming. Common symptoms of low thymus function include:[10]

- Heightened susceptibility to the common cold and influenza
- Persistent chronic illnesses with nonspecific symptomology
- Persistent fatigue or being easily fatigued
- Slow wound healing
- Signs of premature or accelerated aging

Considering the importance of your thymic function, it stands to reason you'd want to optimize it to the best of your ability. As noted by Williams:[11]

> *"Even in healthy aging, the immune function deteriorates. That's because, in humans, the thymus gland ages faster than the rest of the body. It reaches its peak during adolescence and begins to atrophy with a significant decrease in size and function by middle age. By 75 years, the thymus weighs only 1/6 of its maximum weight of 37 grams during youth.*
>
> *Aging is inevitable and irreversible. Some age slower and live longer than others. But, sooner than later, everyone's thymus shrinks. Declining thymus*

function with accompanying glandular atrophy contributes to susceptibility of infection, autoimmunity, and an increased risk for cancer.

We don't know why the thymus gland atrophies at such an alarming rate, but aging researchers consider preventing thymic atrophy pivotal in prolonging health during aging. So, it makes sense to protect your thymus starting around 35 years. And, becoming very proactive by ages 45-55."

How to Rejuvenate Your Thymus

So, how do you rejuvenate your thymus? Williams reviews several strategies that can support and restore its function, starting with a healthy diet and restorative sleep. You can find my latest recommendations on these topics in "**A Surprising Reason Why You May Need More Carbs in Your Diet**" and "**Why Sleep Deprivation Is a Recipe for Ill Health**."

Other supportive strategies include the following. For additional recommendations and general dosage suggestions, see Williams' article:[12]

- **Vitamins and minerals —** Zinc and vitamins A and C are particularly important for thymic function. Zinc is essential for optimal T cell function, while vitamin A supports the overall function of the thymus. High-dose vitamin C can help prevent atrophy and increases the number of T cells.

- **Herbs —** Huangqi (astragalus membranaceous) is a traditional Chinese medicine (TCM) remedy used to improve energy and stamina, prevent cold and flu, and slow aging.

  Compounds within astragalus have been shown to have antioxidant, anti-inflammatory and immunoregulatory effects; they also boost telomerase activity, which is thought to increase longevity. Williams recommends an extract of the herb sold under the generic name of Astragaloside IV, or the brand name TA-65.

- **Thymus gland extract —** Thymic Protein A (TPA), made from calf thymus, has been shown to have immune-modulating and antiviral properties. It supports helper T lymphocytes, reverses thymus atrophy, and strengthens T cell differentiation.
- **Thymus live cell injections —** Typically, intramuscular injections are administered daily for 10 days, followed by weekly or monthly injections thereafter. Thymus alone is given to "prime" your immune system, while a combo of thymus and spleen is used to restore immune function.

  Live cell injections are not approved by the U.S. Food and Drug Administration, but naturopathic doctors can obtain them from German and Swiss manufacturers and are licensed to use them.
- **Thymic peptides**, such as:
  - **Thymalin, the synthetic version of thymulin —** It regulates immune function, lowers inflammation, increases T cell activity, raises immunoglobulin A, and it has neuroprotective effects.
  - **Thymosin Beta 4 (TB-500)**, which protects against viral infections, improves tissue regeneration and promotes bone remodeling after fractures.
  - **Thymosin Alpha-1**, which supports immune function against chronic viruses and fungal infections.

Growth Hormone and IGF-1 Boosts Size and Function of Thymus

Williams also recommends supplementing with human growth hormone (HGH) and insulin-like growth factor 1 (IGF-1) to improve the size and function of your thymus.

I do not recommend supplements for this, as they tend to be extremely costly and can have adverse side effects. Instead, consider implementing lifestyle strategies that raise HGH and/or IGF-1 naturally, such as:

High-intensity interval training — HIIT has been shown to dramatically increase HGH. To further boost HGH, restrict sugar intake for two hours post-exercise. Consuming sugar or fructose within two hours prior to or after high-intensity exercise will nullify HGH production.

Blood flow restriction training (BFR) or KAATSU — BFR involves exercising your muscles while partially restricting arterial inflow and fully restricting venous outflow in either both proximal arms or legs.[13] By restricting the venous blood flow, you create a relatively hypoxic (low oxygen) environment in the exercising muscle, which in turn triggers a number of physiological benefits, including the production of HGH and IGF-1.[14]

Sauna therapy combined with exercise also have synergistic effects that increase HGH.

Intermittent fasting — Research has found that fasting raises HGH by 1,300% in women and 2,000% in men.[15]

Whole Body Vibration (WBV) training has been shown to boost both HGH and IGF-1.[16,17]

Red and near-infrared light therapy activates genes involved in cell repair, cell regeneration and cellular growth, depending on the tissue. In your muscles, it locally increases expression of IGF-1.

Sources and References

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