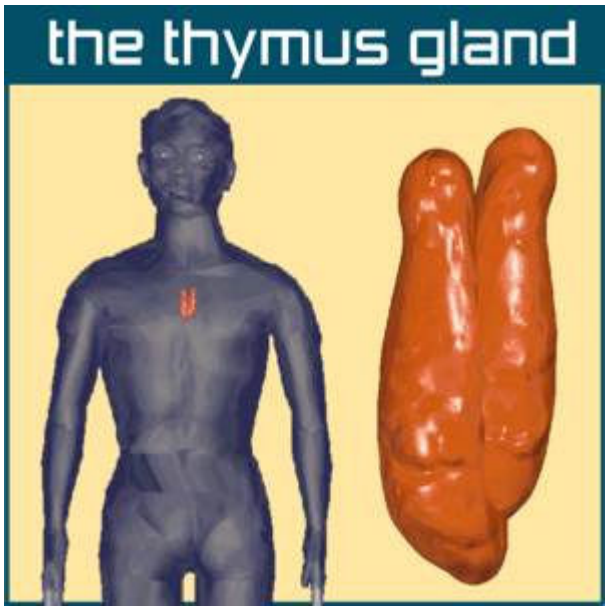
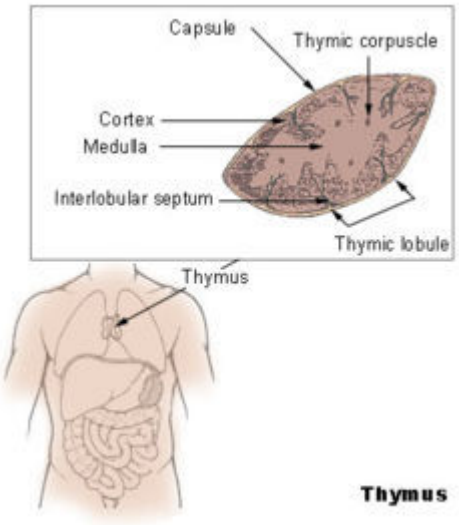


Thymus



Thymus

The thymus gland is a pink-grey organ that lies underneath the top of the breast bone. In The thymus gland is a pink-grey organ that lies underneath the top of the breast bone. In animals it is known as the sweetbreads. No one knew much about the thymus until recently. On autopsies it was noticed that young adults that had died in traumatic accidents often had much larger thymus glands than those dying from diseases of a chronic nature, and it was also believed that the thymus ceased to function after childhood.

We are just now unraveling the mysteries of this gland. The thymus processes a type of white blood cell known as a T-lymphocyte. These T-lymphocytes govern cellular immunity which means that they help cells recognize and destroy invading bacteria, virus and abnormal cell growth such as cancer and foreign tissues (transplant rejection mechanism).

History

The thymus was known to the Ancient Greeks, and Galen was the first to note that the size of the organ changed over the duration of a person's life.

Due to the large numbers of apoptotic lymphocytes, the thymus was originally dismissed as a "lymphocyte graveyard", without functional importance. The importance of the thymus in the immune system was discovered in 1961 by Jacques Miller, by surgically removing the thymus from three day old mice, and observing the subsequent deficiency in a lymphocyte population, subsequently named T cells after the organ of their origin. Recently advances in immunology

have allowed the fine dissection of the function of the thymus in T cell maturation.

Anatomy

The thymus is of a pinkish-gray color, soft, and lobulated on its surfaces. At birth it is about 5 cm in length, 4 cm in breadth, and about 6 mm in thickness. The organ enlarges during childhood, and atrophies at puberty.

The thymus will, if examined when its growth is most active, be found to consist of two lateral lobes placed in close contact along the middle line, situated partly in the thorax, partly in the neck, and extending from the fourth costal cartilage upward, as high as the lower border of the thyroid gland.

It is covered by the sternum, and by the origins of the sternohyoidei and sternothyreoidei.

Below, it rests upon the pericardium, being separated from the aortic arch and great vessels by a layer of fascia.

In the neck, it lies on the front and sides of the trachea, behind the sternohyoidei and sternothyreoidei.

The two lobes generally differ in size; they are occasionally united, so as to form a single mass, and sometimes separated by an intermediate lobe.

Embryology

The two main components of the thymus, the lymphoid thymocytes and the thymic epithelial cells, have distinct developmental origins. The thymic epithelium is the first to develop, and appears in the form of two flask-shape endodermal diverticula, which arise, one on either side, from the third branchial pouch (pharyngeal pouch), and extend lateralward and backward into the surrounding mesoderm and neural crest-derived mesenchyme in front of the ventral aorta.

Here they meet and become joined to one another by connective tissue, but there is never any fusion of the thymus tissue proper. The pharyngeal opening of each diverticulum is soon obliterated, but the neck of the flask persists for some time as a cellular cord. By further proliferation of the cells lining the flask, buds of cells are formed, which become surrounded and isolated by the invading mesoderm. Additional portions of thymus tissue are sometimes developed from the fourth branchial pouches.

During the late stages of the development of the thymic epithelium, hematopoietic lymphoid cells from bone-marrow precursors immigrate into the thymus and are aggregated to form lymphoid follicles.

The thymus continues to grow between birth and puberty and then begins to atrophy, a process directed by the high levels of circulating sex hormones. Proportional to thymic size, thymic activity (T cell output) is most active before puberty. Upon atrophy, the size and activity are dramatically reduced, and the organ is primarily replaced with fat (a phenomenon known as "involution"). The atrophy is due to the increased circulating level of sex hormones, and chemical or physical castration of an adult results in the thymus increasing in size and activity. Patients with the autoimmune disease Myasthenia gravis commonly (70%) are found to have thymic hyperplasia or malignancy. The reason or order of these cirumstances has yet to be determined by medical scientists.

Age	**Grams**
birth	about 15 grams;
puberty	about 35 grams
twenty-five years	25 grams
sixty years	less than 15 grams
seventy years	about 0 grams

Function

In the two thymic lobes, lymphocyte precursors from the bone-marrow become thymocytes, and subsequently mature into T cells. Once mature, T cells emigrate from the thymus and constitute the peripheral T cell repertoire responsible for directing many facets of the adaptive immune system. Loss of the thymus at an early age through genetic mutation or surgical removal results in severe immunodeficiency and a high susceptibility to infection.

The stock of T-lymphocytes is built up in early life, so the function of the thymus is diminished in adults. It is, therefore, largely degenerated in elderly adults and is barely identifiable, consisting mostly of fatty tissue.

However up to January 2001, it was thought that whilst the thymus gland is important to the immune system in the developing fetus, the gland becomes redundant after birth, and so can be surgically excised without harm to the patient.

The ability of T cells to recognize foreign antigens is mediated by the T cell receptor. The T cell receptor undergoes genetic rearrangement during thymocyte maturation, resulting in each T cell bearing a unique T cell receptor, specific to a limited set of peptide:MHC combinations. The random nature of the genetic rearrangement results in a requirement of central tolerance mechanisms to remove or inactivate those T cells which bear a T cell receptor with the ability to recognise self-peptides.

The thymus continues to function as an endocrine gland, producing the hormone thymosin, which stimulates the activity of the T-lymphocytes.

Two primary forms of tumours originate in the thymus.

Tumours originating from the thymic epithelial cells are called thymomas, and are found in about 25-50% of patients with myasthenia gravis. Symptoms are sometimes confused with bronchitis or a strong cough because the tumor presses on the

recurrent laryngeal nerve. All thymomas are potentially cancerous, but they can vary a great deal. Some grow very slowly. Others grow rapidly and can spread to surrounding tissues. Treatment of thymomas often requires surgery to remove the entire thymus.

Tumours originating from the thymocytes are called thymic lymphomas.

Thymus - research

In the 1960's research showed that immature white blood cells would "incubate" for a period inside the TG, and exit transformed into one of the specific types of T-lymphocytes, such as T4 helper cells or T8 suppresser or cytotoxic T cells.

By the 1970's, the TG began to be viewed as an endocrine gland, similar to other endocrine glands, such as the pituitary or thyroid.

Thus, pioneer TG hormone researcher Allan Goldstein, MD stated in concluding his classic 1974 paper Thymosin and the Immunopathology of Aging: "Our studies indicate that the thymus controls the maturation of T cells by an endocrine mechanism, and that the hypothesis that the [TG] must come into contact with T-cell precursors is no longer tenable. We propose that the [TG] secretes thymosin, and perhaps other hormones, which can act at sites distant from the thymus to influence the ontogenesis [and] function... of lymphoid cells involved in cell mediated immunity."

By the 1990's, at least 4 different peptide hormones naturally secreted by the TG had been discovered and clinically tested. These included the Thymosins, a group of 40 or so related peptides, found in thymus extracts called "Thymic Fraction 5"; Thymopoietin; Thymulin; also called "Facteur Thymique Serique"; and Thymus Humoral Factor.

Collectively, these TG hormones have been shown, in human, animal and in vitro studies, to have a broad range of action, well beyond merely maturing and differentiating T cells.

Thymus -Action

TG hormones can increase key immune signals, called "lymphokines", including interleukin 2 (IL2), interferon, colony stimulating factor, and others (4,6). TG hormones can cause greater numbers of T cells to develop more IL2 receptors more quickly, which is critically necessary to allow rapid white blood cell proliferation and activation to fight invading germs .

TG hormones can prevent the tissue wasting that occurs with TG removal or severe TG atrophy, and promote healthy weight gain in disease states- such as AIDS- where catabolic body wasting is typical.

TG hormones can reduce autoimmune reactions, clinically and experimentally, such as occur in rheumatoid arthritis.

TG hormones prevent the bone marrow injury and subsequent reduction in white and red blood cell production, frequently produced by X-ray or chemotherapy cancer treatment.

TG hormones can increase disease-fighting antibodies when they're needed, yet reduce the levels of the "allergic antibody" IgE, in patients suffering allergic rhinitis, asthma, and atopic dermatitis. These are just some of the many ways TG hormones have been shown to enhance, restore, and balance immunity!

As cellular physiologist Dennis Fahy has noted: "If you restore immune function, your ability to make DNA, to have normal cell division, to have normal insulin sensitivity, to have normal thyroid levels and other things, such as normal population of certain molecules in the brain that change with age, all these things are restored by an improvement in the immune system."

Thymus- aging and growth hormone

As the thymus gland shrinks with age, so the blood levels and activity of various TG hormones decline with age. Thus, Goldstein observed a significant drop in blood thymosin levels in normal individuals between the ages of 20 and 40. Thymulin, a zinc-activated TG hormone, shows bioassay evidence of a significant drop in activity in aging, healthy adults, and in hypothyroidism.

Since TG hormones are secreted by the very TG cells that "shrivel up" and waste away due to aging, stress, disease, radiation and malnutrition etc., the drop in TG hormone activity with aging should hardly be surprising.

Part of the restorative, rejuvenate, anabolic, general health-enhancing effects of TG hormones may relate to the parallel and synergistic interactions between the pituitary and TG, and growth hormone (GH) and TG hormones.

TG hormones increase the number, activity, and healthy structure of T cells, and T cells secrete GH and GH releasing hormone. Furthermore, they can stimulate the pituitary to release GH.

Also, experimental TG removal is accompanied by degeneration of the pituitary cells that produce GH.

Thymus- immune system

Another important effect of TG hormones is their immune normalizing action. TG hormones do not automatically just "turn up the volume" and increase all immune activity. Rather, TG hormones tend to reduce immunity when excessive, as evidenced by overly high T4: T8 ratios, often seen in rheumatoid arthritis.

TG hormones increase immune activity when it is weak, as shown by low T4: T8 ratios, a hallmark of AIDS. TG hormones will also more precisely normalize the T4: T8 ratio in persons who's T4: T8 ratio is

already more or less normal, and brings the ratio closer to the "ideal", healthy T4: T8 ratio of 1.74.

A retrospective study of the results from clinical trials with 130 patients suffering various ailments, who received oral pharmaceutical thymus extract demonstrates this clearly. 40 subjects had T4: T8 ratios below normal (under 1.02); 78 had normal ratios (between 1.02 and 2.46); while 12 cases had above normal rations.

After 3-months the oral therapy had increased the below-normal group's T4: T8 ratio from 0.72 to 1.10, while the above-normal ratio group decreased from 3.33 to 2.18. The already normal T4: T8 ratio group increased their ratio slightly from 1.53 to 1.70, almost exactly the "ideal", healthy ratio of 1.74 (9).

Thymus- little known

Although it is little known, even to most alternative/ anti-aging medicine devotees, there is a large body of published, human clinical research supporting the use of oral TG extracts. They have been used in a broad range of conditions, ranging from cancer treatment, to rheumatoid arthritis, to various allergy and asthma conditions, to recurrent respiratory infections and hepatitis (see reference 5 for a detailed list of references).

These studies have generally shown TG extracts to be extremely non-toxic and side-effect free, with few contraindications for use.

The main block to the acceptance of the efficacy of oral TG extracts is the erroneous yet widespread belief that all proteins and peptides taken orally, as food or supplements, are 100% digested to individual amino acids before absorption, from the intestine into the body.

If this were true, then indeed orally administered TG peptide hormone extracts would be broken down completely during digestion, becoming merely very expensive, low dose amino acid supplements, with no more immune activity than (for example) a few

hundred milligrams of ground beef protein! Yet it has been known since the 1970's that significant quantities of various proteins, such as gliadin from wheat, milk casein, ferritin, haemoglobin and milk immunoglobins routinely survive digestion and enter the body- and even the brain- intact.

The pioneering research of W.A. Hemmings and Ziovdrov and colleagues had repeatedly demonstrated this in a wide variety of experiments using many different proteins, by the late 1970's.

In the 1997 textbook Oxidology, Bradford and Allen even explain the mechanism of how this occurs. It is based on a cellular process called "pinocytosis."

Thymus- Thym-Uvocal ®

Thym-Uvocal ® (TUV) is not just a "desiccated whole thymus glandular extract" of the sort found in health food stores.

The active substances in TUV are obtained by a selective, multi-stage biotechnology process. The starting material is TG's from strictly selected and healthy calves.

Tissue from any given animal is used only after a veterinary physician has examined the live animal and issued a certificate of good health.

Before the tissue is processed, histological and bacteriological tests are performed. During the multi-stage processing, proteins and prohormones in the tissue are enzymatically cleaved to short-chain pharmaceutically active oligopeptides.

Filtration and special heat treatment ensure the inactivation and removal of any microorganisms. The controlled and reproducible manufacturing process produces an activation and concentration of the desired low molecular weight peptides.

The various major TG hormones range in molecular weight from 860 Daltons (Thymulin) to 5600 Daltons (Thymopoietin). Injectable TUV is standardized to be under 2000 Daltons molecular weight, thus minimizing the risk of allergic

reaction, while the oral form TUV has a molecular weight under 10,000 Daltons.

Since animal experiments and human clinical research has found no single TG hormone to be capable of performing all the immune-optimizing functions induced by the TG family of hormones as a whole, pharmaceutically balanced TG polypeptide hormone mixture is both more "natural", and more likely to be safe and effective, than any specific thymic hormone.

TUV has been in clinical use in Europe since 1976. The German company-Mulli which produces TUV has published research, as well as in-house and physician anecdotal evidence to support the efficacy and safety of TUV (13).

Who can benefit from Thym-Uvocal ®?

1. Patients, both children and adults, with infections, autoimmune, allergic and cancerous conditions, both acute and chronic, have been shown to benefit from Thym-Uvocal ® (TUV), whether taken by injection or orally. Hepatitis, recurrent respiratory infections, early-stage AIDS, candidiasis, rheumatoid arthritis, asthma and skin conditions have all been treated successfully with TUV or similar pharmaceutical TG extracts.

2. Thym-Uvocal ® is useful as a key endocrine-normalizing, anti-aging therapy, especially for those over 20! Thymus size and hormone activity shrink significantly by the age of 20, after peaking in the first 10-12 years of life. Further significant decline usually occurs by the age of 40, and it's all downhill from there- until death, at whatever age.

3. Thym-Uvocal ® is useful as part of a growth hormone-increasing program. GH and thymic hormones are mutually supporting and synergistic.

4. Thym-Uvocal ® is useful even for those who are relatively healthy, but who suffer frequent colds, flu, and other minor infections.

5. Thym-Uvocal ® (TUV) is useful as an agent to increase energy and vitality, and to "lift the spirits." In his book Life Energy (14), John Diamond, MD provides evidence that the thymus gland controls the acupuncture energy meridians

of the human body, and is the glandular key to vitality, love, courage and the will to live/ will to be well.

Diamond specifically recommends thymus gland (TG) extracts as a major method to restore TG structure/ function.

TUV may be given by subcutaneous or intramuscular injection from the TUV ampoules, or it can be taken orally as TUV tablets.

How to use Thym-Uvocal ®

For rapid results, the injections are taken on alternative days with the tablets. For those not suffering major or life-threatening illness, TUV tablets alone may be sufficient.

1 or 2 ampoules are injected every other day, while 2 tablets (240mg each) are taken 3 times a daily, or 2-4 tablets twice daily are taken on an empty stomach. TUV should be taken daily by those not using injections. Long term, even permanent TUV use is both safe and effective.

TUV cream may also be used topically for minor skin allergic conditions, infections and simply to "youthify" normal skin.

Thym-Uvocal ®- contraindications

There are few known contraindications for TUV use. TUV should NOT be used during pregnancy, unless prescribed by a physician.

TUV should NOT be used by those with thymic tumours, myasthenia gravis, untreated hypothyroidism and those receiving immunosuppressive therapy- e.g. to prevent transplanted organ rejection.

Thym-Uvocal ®- conclusions

To conclude on a personal note; my wife and I have used Thym-Uvocal ® (TUV) off an on since 1993, and continuously since 1996.

Aside from the obvious immune benefits (no colds or flu, almost perfect allergy control), we have both noticed a unique effect from TUV that nothing else in our (rather massive) health/ anti-aging regimen can replace.

We both notice a distinct "vitalizing" and "joie de vivre" effect from oral TUV. I have been using various thymus extracts since the late 1970's, and I have never found any other thymus product to give this unique effect.

We have periodically stopped taking TUV until we noticed a drop in mood or energy, and upon resuming TUV we notice the uplift after taking just one or two doses! It's an extremely pronounced effect within 3-7 days.

Our personal experience with TUV very much confirms John Diamond's views on the thymus gland in his book Life Energy.

Thym-Uvocal ® is one of our core pro-health supplements.