MODERN CONCEPTS IN THE EMBRYONIC AND POSTEMBRYONIC DEVELOPMENT OF THE THYMUS

Shaudirboyeva Umida Shaxriboyevna
Nazarov Botir Saidmurod O'g'li
Student of Tashkent Medical Academy of the Republic of Uzbekistan

Purpose: study of embryonic and postembryonic changes in the thymus

Annotation: the thymus is an important organ for the development of the immune system, especially for the maturation of T-lymphocytes. This article examines current concepts of embryonic and postembrional development of the thymus, focusing on recent advances in understanding its origin, structure and function. We study the interaction of genetic, molecular and environmental factors that affect the development of the thymus, including the role of thymus epithelial cells and signaling pathways. In addition, we study the effects of these findings for immunological studies and potential therapeutic approaches for thymus dysfunction and related diseases. Understanding the developmental biology of the thymus not only improves our understanding of the functions of the immune system.

Keywords: thymus, immune system, postembrional development of thymus

Maqsad: Timusning embrional va postembrional o'zgarishlarini o'rganish

Annotatsiya: Timus immunitet tizimining rivojlanishi uchun, ayniqsa T-limfotsitlarning etukligi uchun muhim organdir. Ushbu maqolada timusning embrion va postembrional rivojlanishi haqidagi hozirgi tushunchalar ko'rib chiqiladi, uning kelib chiqishi, tuzilishi va funksiyasini tushunishdagi so'nggi yutuqlarga e'tibor qaratiladi.Biz timus rivojlanishiga ta'sir qiluvchi genetik, molekulyar va atrof-muhit omillarining o'zaro ta'sirini, shu jumladan timus epitelial hujayralari va signalizatsiya yo'llarining rolini o'rganamiz. Bundan tashqari, biz ushbu topilmalarning immunologik tadqiqotlar uchun ta'sirini va timus disfunktsiyasi va tegishli kasalliklar uchun potentsial terapevtik yondashuvlarni o'rganamiz. Timusning rivojlanish biologiyasini tushunish nafaqat immunitet tizimining funktsiyalari haqidagi tushunchamizni yaxshilaydi.

Kalit so'zlar: timus, immun tizimi ,timusning postembrional rivojlanishi

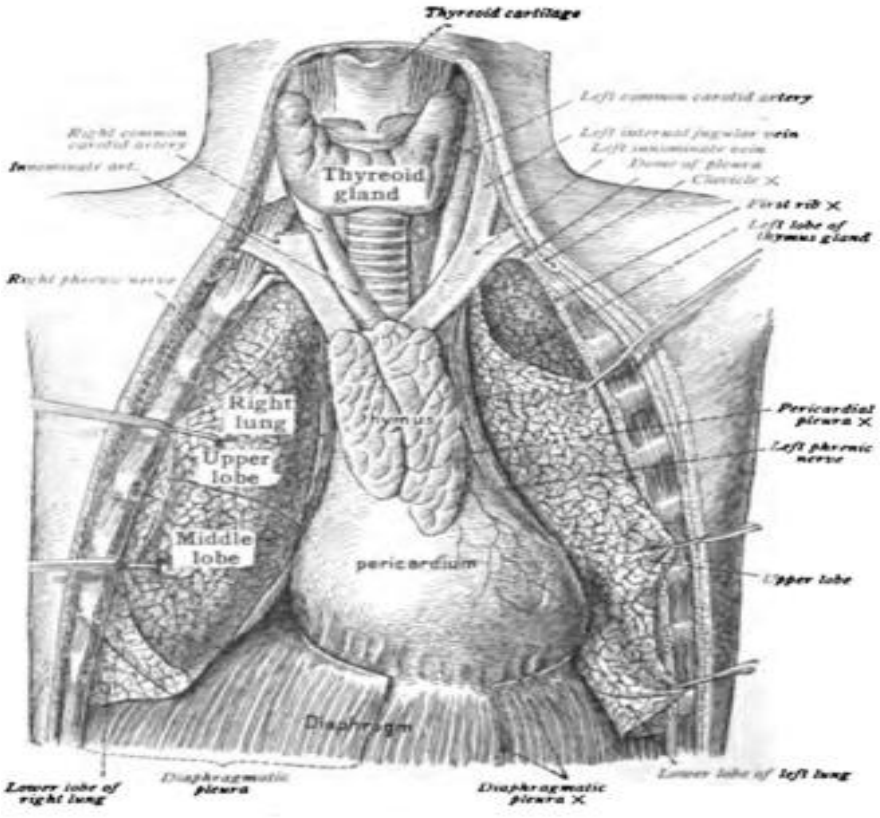
The thymus is a typical parenchyma organ (in which the stroma and parenchyma are separated). If you see the appearance of the histological structure of the thymus, it can be noted that the organ is lobulated. Each lobule has a dark and Light Zone. From a scientific point of view, it is the cortex and the medulla. As mentioned above, the thymus performs an immune function. Therefore, it can rightfully be called a solid backbone of children's immunity. So that this fortress does not fall from the foreign protein-antigen that came first, you need to create some kind of protective function for it. And nature created this protective function and called it the blood-thymus barrier.

Brief description of thymus barrier histology - This barrier is represented by sinusoidal capillaries and a subcapsular epithelial network. This barrier contains capillary epithelial cells. That is, antigens produced by pathogenic organisms

immediately enter the bloodstream, from where they spread throughout the human body. Thymus is no exception, these antigens can end. How do they go there? They can get there through microtomirs, that is, through capillaries. The photo below shows the histology of the drug taken from the thymus, the veins in the stroma are clearly visible.

Thymus (lat. thymus), or thymus is the lymphoepithelial organ of lymphopoiesis of human and many animal species, in which maturation, differentiation and immunological "learning" of T cells of the immune system occurs.

The thymus gland is a small organ with a pink-gray, soft consistency, the surface of which is lobed. In newborns, it is on average 5 cm long, 4 cm wide and 6 mm thick, weighing about 15 grams. The growth of the organ continues until puberty (at this time, its dimensions reach a maximum — 7.5—16 cm in length, and the mass reaches 20-37 grams). With age, the thymus atrophy and in old age is almost no different from the adipose tissue of the mediastinum that surrounds it; at the age of 75, the average weight of the thymus is only 6 grams. With involution, it loses its white color and turns yellow by increasing the proportion of stroma and fat cells.



The thymus is located at the top of the chest, behind the sternum (upper mediastin). From the front, the body of the handle and sternum is located up to the IV costal cartilage; behind — the upper part of the pericardium, covers the initial parts of the aortic and pulmonary trunk, the aortic arch, the left brachiocephalic vein; from the side — the mediastinal pleura.

In the human embryo, the thymus lies in the endoderm of the third Gill pocket at the 6th week of development. In a newborn, the thymus grows up to 15 g, by the age of 15 to 40 g, then by the age of 30 the weight is about 25 g, by the age of 70 — only 6 g.in exceptional cases, adults may not have a clear involution of the thymus gland, a condition called lat status thymicolymphaticus gland involution is also delayed in sterilized animals.

The thymus stroma originates from the epithelium in the anterior part of the primary intestine. The two cords (diverticulum) originate from the third Gill arch and grow to the anterior mediastinum. Sometimes the thymus stroma is also formed by additional threads of the fourth pair of Gill arcs. Lymphocytes originate from vascular

cells that migrate from the liver to the thymus in the early stages of intrauterine development. Initially, different blood cells increase in thymus tissue, but soon its function decreases to the formation of T-lymphocytes. The size of the thymus is maximum in childhood, but after puberty, the thymus undergoes significant atrophy and involution. An additional decrease in the volume of the thymus occurs with aging of the body, which is partly due to a decrease in immunity in older people, the thymus is the central organ of lymphocytopoiesis and immunogenesis. The thymus is deposited as an exocrine gland from the epithelium of 3-4 Gill pockets at the beginning of the 2nd month of embryonic development. In the future, the thread connecting the gland with the epithelium of the Gill pockets undergoes reverse development. At the end of the 2nd month, the organ is colonized by lymphocytes. The thymus (goiter or thymus, gland) is the central organ of the immune system, in which antigen-independent proliferation and differentiation of t-lymphocytes from precursors arising from the red bone marrow occur. It achieves the most development in childhood, after puberty it undergoes age-related involution, partially replaced by adipose tissue.

It is covered with a connective tissue capsule, which is divided into sections that contain veins and divide it into interconnected lobules. The lobule consists of a three-dimensional network of EPI-telial (epithelioretic) cells with a process forming an organ stroma, in the Rings of which lymphocytes (thymocytes) are located. In each lobule, the cortical and medulla are separated.

The cells of the cortical substance are in a certain way separated from the blood by the hemattimus barrier,protecting the differentiated lymphocytes of the cortical substance from excess antigens. It contains basal membrane hemocapillary endotheoial cells, pericapillary space, single lymphocytes, macrophages, and intercellular matter. The barrier has selective permeability to antigenatimus as one of the central organs of the immune system, the maturation of t-lymphocytes from progenitor cells and the site of the formation of a large number of different mature T-lymphocytes that can recognize any antigen with receptors. Lymphocytes located in the thymus are called thymocytes.

In the thymus, several processes are carried out in parallel: an increase in t-lymphocytes, their maturation (differentiation), the selection of cells suitable for this organism, which is accompanied by the death of a large part of unsuitable cells. Early progenitor cells of t-lymphocytes from the bone marrow enter the cortical layer of the thymus. Gradually, they migrate from the cortical layer of the thymus to the brain, making contact with thymic epithelial cells, macrophages, and dendritic cells. Thymocytes are affected by hormones produced by thymic epithelial cells: thymulin, al - i (34-thymosins, thymopoietin, which control their differentiation. In the process of transition to the brain layer, thymocytes mature (differentiate), gradually occupying the surface receptors and antigens characteristic of mature t-lymphocytes.

Thymus receives thymocytic signals from stromal cells and the molecules they produce: increased proliferation, changes in surface phenotype (a combination of molecules present on the surface of cells), restructuring ("rearrangement") of genes responsible for the diversity of specific antigen-recognition receptors. The main function of mature T-lymphocytes is to recognize foreign antigenic peptides in a complex with its own molecules of the main histocompatibility complex on the

surface of antigen-presenting cells. To perform this function, T-lymphocytes have specific antigen recognition receptors. The selection of thymocytes is carried out in two stages . After the formation of t-cell receptors of a certain specificity in the thymocyte, the later stages of development include thymocytes, which have demonstrated the ability to recognize their molecules of the main histocompatibility complex, which is present only in the epithelial cells of the thymus cortex of a particular organism. Unlike mature t-lymphocyte, which receives an activation signal upon meeting an antigen peptide specific to the T-cell receptor, immature thymocytes in the thymus receive a genetically programmed death signal by recognizing autoantigenic peptides specific to T-cell receptors — apoptosis. Thus, the autoreactive t-lymphocytes are "destroyed", 95-98% of thymocytes die in this way in the thymus every day. Only 2-5% of thymocytes, in the form of mature T-lymphocytes, leave the thymus every day, enter the blood and settle in the lymphoid organs.

Epithelioreticular cells are light, oxyphilic, with a light nucleus, a large nucleus, and moderately developed organelles. With their processes, they cover thymocytes, creating the microenvironment necessary for their division and maturation . There are several special variants of epithelial cells in the cortical substance:

1) secretory cells (several types) - present in the cytoplasm me secretory granules. Development of factors necessary for Co ripening of thymocytes: thymosin, thymopoietin, thymus serum factor et al. the first two also enter the blood and are capable of Wat is a movement outside the thymus, which allows him to be viewed as an Endo crane diaper;

2) "nanny cells" - several in their cytoplasm dozens of actively dividing and often dying thymocytes distinguish them from surrounding cells and, perhaps, participation in their selection; perivascular cells are covered with flattened processes capillaries and hematoma-serve as an element of the thymus barrier (available only in cortical matter), preventing the effects of Compass antigens in the blood on mature thymocytes.

The structure of the fence includes the following (See Photo). 2-3):

(1) capillary endothelium (Fairy in some places qit).;

(2) capillary basal membrane;

(3) capillary space containing fairy fibers and poppies rofags;

(4) basal membrane of epitheloreticular cells;

(5) epithelioretic cell cytoplasm- with mosoms.

Conclusion: the thymus is the central or main organ of the lymphoid (immune) system. Its main tasks are to ensure the maturation and differentiation of thymocytes, to integrate different populations of thymocytes and macrophages to carry out immune responses. The article will study and present the latest scientific information about the development of the thymus, its structure and cell composition. Literature using both well-known and new sources. This article shows the external characteristics of the thymus structure, the internal structure, as well as the cells of the compound. In particular, attention is paid to the description of the timus zones, since it has not been established among morphologists so far. consensus on this issue. Embryonic development has also been described in morphometric parameters at different periods of prenatal development. This article is about scientific and diploma work, books, dissertations on the issue of thymus development, since the most

relevant information on this topic is collected here. Keywords: thymus; immune system; morphology; ontogenesis.

The thymus is the central or main organ of the lymphoid (immune) system. It is known that the main tasks of providing thymocyte maturation and differentiation, integration of different populations of thymocytes and macrophages to carry out immune responses. The morphofunction state of the central organ largely determines the activity of secondary (peripheral) structures of immunogenesis and the severity of the protective reactions of the whole organism. In all mammals, the thymus is located in the mediastinum. One person has the upper mediastinum at the front. On its ventral surface are the adjacent sternum body, sternohyoid and sternothyroid muscles, parietal pleura and dorsal - pericardium, trachea, aortic arch, internal cervical and brachiocephalic veins, recurrent laryngeal nerve . In mice, the thymus is located in the abdominal mediastinum. It is known that the thymus consists of lobes. In the 19th century. the number of shares recorded in the human thymus differs from one (right and left lobes with attachment) to five, which was confirmed in the 20th century.

Used Literature

1.Jiang, H., &Zhang, Z (2021).Modern concepts in Modern concepts of embryonic and postembryonic development of the thymus.Cellular and molecular ICellular and molecular immunology,18 (3)https://doi.org/10.1038/s41423-020-00534-1

2.World Health Organization (WHO). (2021). ." World Health Organization. https://www.who.int