SPECIFIC DEVELOPMENTAL FEATURES OF THE THYMUS IN CHILDREN

Akhmedova Sh.M.[1]

[1]Bukhara State Medical Institute, Uzbekistan

Absract: Thymus is the main secret of medicine (primarily immunology) and especially pediatrics. In the twentieth century, the attitude of scientists to the organ developed as a generator and regulator of immune reactions, a participant in the production of large populations of immunocompetent cells.

The thymus is an important organ of the immune system in children. It consists of two segments located in the upper chest and connected in front of the trachea. The gland grows until the child reaches puberty, weighs 30-40 grams, and then gradually atrophies (reverse development).

The thymus is a major component of the immune system and, in many ways, a central organ. Infectious diseases, systemic autoimmune diseases, oncology, the problem of tissue incompatibility determine a person's life, in connection with which there is a growing scientific interest in the study of the immune system and its central organ - the function of the pancreas. The complexity of the study lies in the large number of integral connections with other components of the immune system of the pancreas, neuroendocrine, hematopoietic and connective tissues, organs that provide the barrier function, etc.

Keywords: thymus gland; children; evolution of the pituitary gland; thymic morphology

Modern views suggest that the thymus gland is primarily the central organ of the immune system, which determines central and humoral immunity. Living factors are involved in the differentiation of thymocytes, which, in turn, select antiviral, antifungal, antitumor, antitransplant, anti-tuberculosis and other types of immunity. Strong interaction of thymocytes with B-lymphocytes through T-cell messengers provides adequate humoral immunity. A large population of lymphocytes A large population of lymphocytes binds and interacts with the histocompany system and the microbiome, phagocytic mononuclear cells and complements, cellular forms of barrier organs (skin, mucous membranes, etc.), endocrine (via receptors, cytokines)) and the nervous system in the final As a result, it creates a strong continuum that functions organically, provides control of the stability of the internal environment and is called the body's immune system. A deficiency or impairment of one of the main joints of the immune system (including the thymus gland) should affect the functioning of the entire duration (large or small), and this should be manifested primarily by weak protection against infections, systemic, oncological diseases, tuberculosis, etc. there is a risk.

The thymus is not only a key member of the immune system, but also interacts with the formation of the hypothalamic, endocrine and lymphoid organs during the development of the endocrine system.

Although the term "thymus" has been known since ancient medical times, the history of this organ goes back about 400 years. Its structure and functional properties have not been sufficiently studied at different times [1, p. 232].

The research literature describes several variants of the origin of the name of the organ. Fork-shaped anatomical form of the thyroid gland gave it the name "thymus". Perhaps the name of the organ is also associated with the Greek words "thymos" - soul [1, p. 232, 2, p. 270].

One of the most important immunological functions of the thymus gland was discovered in 1961 by immunologist Jacques F.A.P. Miller notes that the thymectomy performed on mice after birth makes them very susceptible to various infections and leads to their premature death. He also observed significant lymphopenia in the blood, spleen and lymph nodes of these mice. These animals also could not refuse foreign skin transplantation, which at that time was an important characteristic of the immune response. Miller concluded that thymus-dependent (T) lymphocytes are the organ responsible for the development of immunocompetent cells that make up a specific cell population.

To date, many publications have been published on the study of the morphology and role of the thymus in the immune response, but, as before, in 2016, Zygmunt Zdroevich, Evelina Pachura emphasized the regulatory role of the thymus in the immune system and harmonize the entire body. the immune system. Since the bone marrow is a donor, for example, of the hematopoietic, cardiovascular and other systems, it is also the main donor of cells in the lymphatic system. In the thymus, progenitor cells are formed, which then divide into mature T cells [3, p.369-375].

In the same year, Rita Rennazi, Lorenzo Nardo, Gaia Favero, Anderson M.S., Lio S.V. confirmed the concept that the thymus is the primary lymphoid organ responsible for the production of immunocompetent T cells; The thymus and its specific microenvironment (stroma) play a key role in many developmental processes leading to the formation of functionally mature T cells [4, p. 313- 351]. Nevertheless, the morphological appearance of the organ, its stability and its multifaceted interactions with other organs and systems (including the mother-plantant-fetus system) remain a serious problem in the study of the direct functions of this gland. The thymus plays a unique role in the fight against infections in humans and especially in children.

To date, embryogenesis and the anatomical location of the thymus gland have been studied to some extent. By the end of the first month of intrauterine development, the thymus gland is located in pairs III and IV of ribbon pockets. By the time a child is born, it is the largest and only fully systemically and functionally formed lymphoid organ in the body. Thymus morphogenesis is approaching its final stage by 17 weeks of intrauterine development; By week 21, the thymus gland becomes clearly visible on ultrasound [6, p. 25], and finally, by week 24, thymopoietic function is fully restored. From 21 to 36 weeks of pregnancy, the thymus gland increases by 1.7-1.9 times; From week 37, the rate of its growth slows down (growth does not exceed 1.3 times).

It should be noted that in healthy newborns, the thymus gland is fully formed, works well and is fully active, regardless of the activity of this organ of the mother [7, p. 170-175]. The pancreas of a newborn is 0.5 percent of body weight (i.e. 10-15 grams), the spleen is 11 grams, and the heart is 24 grams.

It is believed that the weight of the gland in newborns can range from 3.2 g to 20.0 g [5, p. 152].

The authors of publications on postmortem examination of the pancreas note that the average weight of the pancreas in a newborn is 4.8 g, at 1 month - 5.9 g, at 2 months - 7.9 g, at 6 months - 9.4 g. at the age of 1 year - 10.8 g, at the age of 2 years - 9.9 g [2]. According to some morphological researchers, the fastest growth of the pituitary gland is observed in the first year of a child's life, and the maximum body weight in relation to body weight is recorded at the age of 2-4 years. The absolute maximum mass of the pancreas (25.0–40.0 g) is observed during puberty, after which the organ gradually atrophies, and the glandular tissue of the pancreas is replaced by adipose tissue [1, p. 232, 2].

The size and weight of the iris are variable, vary greatly in one age group, and undergo age-related changes [6, 9]. The shape of the iris can be leafy (68.8%), cylindrical (9.6%), pyramidal (conical) (7.2%), in rare cases oval or indefinite [8]. In some cases, the authors point to a link between high blood fluid and pathology; for example, the cylindrical shape is observed in adults or children with chronic diseases, sepsis, purulent pleurisy, and 2-3 degree malnutrition. It is assumed that the uneven growth rate of blood vessels, a change in direction create the necessary conditions for variability in the growth of the thymic parenchyma, which is based on its morphological features in different children in the population [9, p. 19-22].

The greatest production of T-lymphocytes is maintained up to two years of a child's life. It is during these years that primary interactions with infectious factors occur and long-lived T cells are formed, which live and multiply for more than 20 years. In the future, the influx of

new pathogens will become rare, so the body will not be able to retain the entire thymus, and the thymus will undergo age-related involution in comparison with the true thymus by about 3% per year. The pool of mature peripheral T-lymphocytes, created with high energy expenditure (which then migrates from the thymus into the tissue), contains relatively long-lived cells that can respond by clonal expansion (proliferation) to meet the antigen. Consequently, age-related involution of the thymus does not lead to a catastrophic decrease in immunity. In addition, the thymus gland has some compensatory abilities that replace certain functions of T-lymphocytes that are absent in the immune system [11, p. 271-275].

According to modern concepts, the lobules of the thymus parenchyma are divided into 4 structural and functional zones [10, p. 118-121]:

1. The subcapsular zone, in which there is the possibility of detecting pre-T-lymphocytes, which are not a lymphoid element of the thymus, as well as the proliferation of T-lymphocytes and the first stage of their maturation.

2. When using antigens of the first and second class of the HLA system, as well as under the influence of thymus hormones and interleukins, the inner cortical zone, which is in direct contact with macrophages and the epithelium, affects the latter. Maturation stage of T cells.

3. Medullary zone, in which there are mainly mature T-lymphocytes, and, probably, their antigen independent development occurs in contact with interdigitating and epithelial cells, as well as under the influence of thymus hormones and interleukins. It is from this zone that mature T cells migrate from the organ to the periphery.

4. Intralobular perivascular cavities, in which T-cells move, and in the cortex, these cavities are also part of the blood-thymic barrier, which includes the basement membrane, pericytes and vascular endothelial epithelial cells [2].

Age-related involution is a characteristic feature of the thymus gland. Age-related involution leads to an increase in the number of infectious and autoimmune diseases, as well as a decrease in the effectiveness of the vaccine in old age. Age dependence is the same irreversible and normal physiological process as the aging process. With involution, the amount of fat and collagen increases, and the percentage of water decreases. The size of the organ decreases due to atrophy [13, p. 73-78].

The size of the thymus gland reaches a maximum by the age of 1 year in comparison with other organs. And if we talk about the absolute maximum weight, it is observed at the age of 12-14 years, then its change is observed. This is likely due to puberty, as sex hormones have been found to cause organ atrophy. The effect of hormones on the thymus is due to the presence of estrogen receptors on the surface of stromal and lymphoid cells. Explicit immunomodulatory

properties, especially the onset of thymic atrophy, are characteristic of B-estradiol [12, p. 305-3011]. Common steroid hormones, especially glucocorticoid hormones, affect lymphoid tissues, and the type of effect depends on the dose of the hormone and the stage of cell differentiation. At different doses, the same hormone can induce both apoptosis and an increase in thymocytes. After the end of puberty, the weight of the thymus decreases annually by about 3% [13, p. 74]. Adipose tissue mainly replaces lymphoid tissue in the area of the connective capsule and septa.

Accidental involution of the thymus (AI), which, according to many authors, may indicate morphological rearrangement of the organ in response to any stressful effect, is of great interest for research.

For example, Pershin S.B. other [14, p. 72-76] associates the stereotypical response of the pancreas to various negative, suppressive effects in the body (illness, injury, intoxication, starvation, frostbite, etc.) with random involution (AI) [14, p. 72-76].

The reasons for the development of random involution can be very diverse. In addition to the above, these are also malignant tumors, metabolic disorders in the body [15, p. 67-74]. Cases of accidental pancreatic involution after splenectomy have also been reported [16, p. 24-28]. The importance of cold curing and hypoxia has also been identified. For example, neonates with acute oxygen deficiency have had occasional pituitary involution (TI) (AB).

The process of changes in the pituitary gland (HP) in children is also associated with training loads, which usually indicate a one-sided pressure regime, creating important conditions for the adaptation of the body, reflecting the age-related dynamics of the development of physiological systems.

Accidental invasion (TI) of the thyroid gland (AB) is often observed in childhood with infectious diseases, especially in the gastrointestinal tract, severe pneumonia, meningoencephalitis, sepsis, local purulent processes (phlegmon, osteomyelitis), malignant tumors, cachexia of various origins [2].

In the monograph "Pathology of the thymus gland in children" [2], he pointed out the difference between such concepts as the complexity of the morphological study of this organ, dysplasia and hypoplasia of the thymus gland, dyschronism (maturity) and atrophy. So far, the reaction of the pancreas to psychoemotional and other stresses remains a mystery. Why, in different situations (for example, during space flights [18, p. 44-46] or under the influence of immunotoxicants [17, p. 90-98], this can manifest itself only in a decrease in the proliferation of thymus cells and reflection of a non-stereotypical response to stress. However, the development of atrophy cannot be ruled out.

Talking about thymic atrophy, Haley et al. (2005), Elmore [20, p. 2-8] suggests the loss of thymus cells, a physiological phenomenon well known in old age. They are not talking about random evolution, but they believe that in many cases thymus atrophy occurs, for example, with psycho-emotional stress, malnutrition, infections and cases after cancer treatment. Thymic atrophy can result from apoptosis of thymocytes, deterioration of thymic structure, loss of ETR current to the thymus, or a combination of the above. According to the authors, these manifestations may result from direct (for example, the effect of HIV infection on thymocytes) and indirect (for example, increased glucocorticoid levels caused by stress), effects on the thymus. In the first case, as in the next, nothing is said about an accidental coup. For example, there are several experimental models and studies in some people in which infection with pathogens leads to atrophy of the thymus. A recent study found that providers are the most susceptible, while SD8 + SP T cells are the most resistant thymus type during Salmonella Tyhi murium infection in mice. In addition, this study highlighted the role of infection-induced IFN-g production in slowing the maturation of CD4 + and CD8 + SP thymocytes [19, p. 63-69]. Why, in cases of acute death in young children, thymomegaly is revealed at autopsy, in others - a sharp decrease in the mass and volume of this organ? Even if this death occurs earlier (and often causes) a bacterial infection in both cases, then there is one reason (infection + stress), but the result is different. It is concluded that the morphological structure (and function) of this organ was initially qualitatively different (before the disease), although evolutionarily, before the birth of a child, there must be criteria for its morphological specificity and maturity [Rovda Yu.I.].

References

1. Kharchenko V.P., Sarkisov D.S., Vetshev P.S., Galil-Ogly G.A., Zaratyants O.V. Diseases of the thymus gland. M.: TriadaKh, 1998.232 p. Russian (Kharchenko V.P., Sarkisov D.S., Vetshev P.S., Galil-Ogly G.A., Zaratyants O.V. Diseases of the thymus gland. M.: TriadaKh, 1998)
2. Ivanovskaya T.E., Zaratyants O.V., Leonova L.V., Voloshchuk I.N. Thymus pathology in children. SPb.: Sotis, 1996, Russian (Ivanovskaya T.E., Zaratyants O.V., Leonova L.V., Voloshchuk I.N.)
3. Zdroevich Z., Pachura E., Pachura P. Thymus gland: a forgotten but very important organ. Adv Clin Exp Med. 2016; 25 (2). Doi: 10.17219 / acem / 58802

4. Rezzani R., Nardo L., Favero J., Peroni M., Rodella L.F. Thymus and aging: morphological, radiological and functional overview. Age (Dordr). 2014; 36 (1). DOI: 10.1007 / s11357-013-9564-5
5. Matkovskaya T.V. Enlargement of the thymus gland in children. Tomsk, 1991.152 p. Russian (Matkovskaya T.V. Enlargement of the thymus in children. Tomsk: TSU, 1991)
6. Esmurzieva ZI Ultrasound description of the thymus gland of fetuses at different stages of pregnancy and children in the first year of life: Author's abstract. dis. Cand. honey. Sciences. M., 2008. Russian (Esmurzieva Z.I.)
7. Kuzmenko L.G., Kiseleva N.M., Simonova A.V. Aging and the thymus gland. J scientific articles Health and education in the XXI century. 2013; 15 (1-4): Russian language (Kuzmenko L.G., Kiseleva N.M., Simonova A.V. Old and thymus // Journal of scientific articles of health and education in the XXI century. 2013. T. 15, No. 1-4. P. 170- 175)
8. Anisimova V.P. About the influence of antenatal pathology on the state of the thymus gland. Immunology and immunopathological conditions in children: Author's abstract. All-Union report. scientific. conf. November 22-24, 1983 M., 1983. S. 18. Russian (Anisimova V.P. On the effect of antenatal pathology on the state of the thymus gland // Immunology and immunopathological conditions in children: Abstracts of the All-Union. Scientific Conf. November 22 - 2008) 24, 1983 M., 1983. S. 18).
9. Petrenko V.M. The initial stages of thymus organogenesis. Trainee J from Appl and Fund Research. 2012; 12: 19-22. Russian (Petrenko V.M. The initial stages of thymus organogenesis//International Journal of Applied and Fundamental Research. 2012. No.12)
10. Sh. M. Axmedova; D.B. Raxmatova **“**Analysis of the distribution of podagric nephropathy (comment)” //SSN: 2249-7137 № 3.1 (96)-2020 // Vol. 11, Issue 1, January 2021 Impact Factor: SJIF 2021 = 7.492
11. Akhmedova Shakhlo Malikovna “Age-Related Features of Changes in the Thymus gland in Children” Central Asian studies // c Special Issue on COVID-19: Yesterday, Today, and Tomorrow ISSN: 2660-4159.
12. Orziqulova Shaxlo. Chronic obstructive pulmonary disease and the metabolic syndrome: the state of the problem // ISSN: 2249-7137 Vol. 11, Issue 6, June, 2021 Impact Factor: SJIF 2021 = 7.492 Academicia: ppt.

13. Orziqulova Sh.A. Thickness of epicardial adipose tissue as a predictor of Cardiovascular risk; Academician an international multidisciplinary research journal / ISSN: 2249-7137 Vol. 11, Issue 9, September 2021 Impact Factor: SJIF 2021 = 7.492.
14. Orziqulova Sh.A. Arterial hypertension and metabolic syndrome: specifics of antihypertensive therapy/Analytical journal of education and development Volume: 01 Issue: 06 | 2021 ISSN: XXXX-XXXX //
15. Sh.A. Orzikulova Obesity and the Cardiovascular System// Research journal of trauma and disability studies// Volume: 01 Issue: 05 | 2021 ISSN: XXXX-XXXX www.academiczone.net ppt 9-16. Jurakulova Zebiniso Akhmatovna. "Current Issues of Infertility Diagnosis and Treatment in Women with Internal Genital Endometriosis" Volume: 01 Issue: 05 | 2021 ISSN: 2181-2616 Synergy: journal of ethics and governance //
16. Mekhriban Ahmadovna. Metabolic Syndrome in Older Women / Volume: 01 Issue: 05 | 2021 ISSN: XXXX-XXXX www.academiczone.net
17. Rizayeva Mekhriban Ahmadovna. Disorders of Carbohydrate Metabolism Overweight and Obesity (Innovations in Social Sciences Volume: 01 Issue: 01 | 2021ISSN: 2181-2594
18. Yakhyoyeva H.Sh.; Rizaeva M.A. Analysis and assessment of anthropometric body mass Index for women of fertilized age in bukhara region / Academician an international Multidisciplinary Research journal// ISSN: 2249-7137 Vol. 11, Issue 9, September 2021 Impact Factor: SJIF 2021 = 7.492//
19. Yaxyayeva Hilola Sharifovna. Thyroid Cancer Diagnostics, Classification, Staging/ Vol. 1 No.5 (2021): Journal of innovations in social sciences/
20. Хилола Шарифовна Яхъяева/COVID-19 и щитовидная железа (обзор литературы)/ Research journal of trauma and disability studies// Volume: 01 Issue: 05 | 2021 ISSN: XXXX-XXXX //
21. Tursunova D.E. Features of the sorption method application in the correction of dyslipidemia and hyperglycemia in diabetes mellitus/ Journal of Innovations in Social Sciences Volume: 01 Issue: 04 | 2021 ISSN: XXXX-XXXX // pp 66-70