FEATURES OF THE IMMUNE SYSTEM IN CHRONIC TONSILLITIS

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The palatine tonsils are a component of the human immune system. Research by researchers has shown their involvement in the formation of systemic and local immunity, as well as in the production of antibodies and cytokines.

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According to modern views, the palatine tonsils are part of the lymphoid tissue associated with the mucous membrane of the nasopharynx (NALT), which participates in creating an immune barrier for the oropharyngeal mucosa, and are secondary organs of the immune system. The palatine tonsils are located at the crossroads of the respiratory and digestive tracts, serving as the primary functional link in the Waldeyer-Pirogov lymphoid ring. Within the parenchyma of the tonsils, between connective tissue fibers, lies lymphoid tissue, which is represented by T-dependent diffuse interfollicular tissue and B-dependent lymphoid follicles. The structure of the follicles in the tonsils is similar to that of other lymphoid organs, with reticular stroma forming the basis of the interfollicular space, in the loops of which lymphocytes are located. The subepithelial zone of diffuse lymphoid tissue in the palatine tonsils, adjacent to the epithelium and constantly exposed to antigenic stimulation, holds particular significance [1,2,3,4,5].

The complex system of epithelial and lymphoid components in the palatine tonsils forms the basis of their morphofunctional unit, named by Fioretti A. (1961) as a “cryptolymphon,” which includes: a) the lumen of the crypt, b) the crypt epithelium segment functioning in lymphoepithelial symbiosis, c) lymphoreticular tissue between the crypt and the secondary lymphoid follicle, and d) the secondary lymphatic follicle, distinguished from the primary by the presence of a germinal center [7,8,9,10].

According to modern immunomorphological data, proliferation and differentiation of effector B-lymphocytes occur in secondary follicles. Postcapillary venules with high endothelium, located in interfollicular lymphoid tissue, facilitate the movement of lymphocytes from the bloodstream into the tissue of the tonsils. These lymphocytes then migrate towards the covering epithelium, infiltrating it above the lymphoid follicles and forming a zone of “lymphoepithelial symbiosis.” According to

researchs the regions of “lymphoepithelial symbiosis” are sites of immunological regulation of the tonsils' function as a lymphocytopoietic organ [11,12,13].

Foreign researchers proposed the concept of the “reticular epithelioid cell” as a type of cell microenvironment for lymphocytes. In their resting state, reticular epithelial cells do not show signs of immunocytes, but during inflammation, they express MHC class II molecules, the co-receptor molecule (CD80), and secrete IL-7. These findings suggest that epithelial cells during chronic inflammation of the tonsils act as antigen-presenting cells to CD4+ T-cells and stimulate proliferating CD8+ T-cells [14,15,16].

Antigen transport across the epithelial barrier is carried out by M-cells, which were first discovered in the epithelium of Peyer’s patches. At the base of M-cells, there are invaginations of the plasma membrane, where T- and B-lymphocytes, dendritic cells, and macrophages are located. Antigens and microorganisms are transcytosed into the pockets of M-cells and then to the lymphoid tissue, as M-cells in Peyer’s patches collect and trans-epithelially transport bacterial and viral antigens. M-cells were later found in the epithelium of the nasopharyngeal and palatine tonsils in humans. Since M-cells in Peyer’s patches collect and transport bacterial and viral antigens, it is reasonable to assume that M-cells in the tonsils serve the same function. M-cells are not antigen-presenting cells, as the antigens transported within them do not undergo lysosomal processing [6,7,8,9,10,11].

According to researchs, the function of the palatine tonsils as representatives of mucosa-associated lymphoid tissue differs from the functions of other lymphoid organs and is primarily focused on specific protection of the respiratory tract mucosa, which is determined by secretory immunity [17,18].

In the lymphatic follicles of the tonsils, activated B-cells migrate through the bloodstream to the mucous membranes. Their expression by endothelial cells is enhanced under the influence of pro-inflammatory cytokines. The direction of migration is determined not so much by the specific mucosal regions from which B-cells initially migrated, but by the area of inflammation. IgA+ B-cell immunoblasts receive additional signals from Th2-cells in the mucosa, supplementing the primary activation that occurs in the lymphatic follicles and follicular structures. Activated Th2-cells in the mucosa secrete cytokines IL-4, IL-5, and IL-6. IL-5 supports the differentiation and proliferation of primarily IgA+B-cells, while IL-6 induces the proliferation of immature plasma cells and the secretion of antibodies of various classes, predominantly IgA, which moves to the surface of the mucosa and binds to the S-component.

According to researchs the humoral response is associated with the germinal center that forms in the primary follicles during the T-dependent response of B-lymphocytes to antigen exposure with the participation of T-lymphocytes, primarily

CD4+ helper cells.

The immune response mechanisms in the tonsils function as follows: antigen is captured, bound, and processed by antigen-presenting cells in the reticular epithelium of the tonsils, which then transfer immunological information to the lymphocytes of the follicles. Follicular dendritic cells play a crucial role in this process. A defect in these cells, due to a lack of lymphotoxin (TNF) production, prevents the development of germinal centers [1,3,5,7,9].

In the germinal centers of secondary follicles, B-cells undergo further development into plasma cells or memory B-cells. From the germinal centers, fully developed B-cells enter recirculation.

B-lymphocytes involved in the immune process combine the functions of auxiliary antigen-presenting cells and antigen-specific cells, bearing MHC class II molecules on their surface in complex with fragments of the antigen recognized by their receptors. Upon interaction with proteins, B-cells undergo monoclonal proliferation and differentiate into plasma cells that produce IgG, IgM, IgA, IgD, and IgE.

In the T-dependent interfollicular zone, there are venules with high endothelium, also known as high endothelial venules. These venules regulate lymphocyte circulation. Upon activation, the endothelium of these venules expresses various adhesion molecules [11,12,13].

According to researchs specific ligand-receptor interactions occur between lymphocytes and endothelium, directing lymphocytes to particular target tissues. This is achieved through the expression of tissue-specific “addressins” by the venular endothelium, which explains the selective recirculation of lymphocytes. As a result, antigen stimulation of lymphocytes in the palatine tonsils predominantly leads to the production of SIgA in the upper respiratory tract [17,18].

Recent studies on endocrine cells belonging to the APUD system, which contain serotonin, norepinephrine, and somatostatin, also hold significance.

Thus, based on the above, the physiological role of the tonsils lies in creating an immune barrier for the mucous membranes of the respiratory tract by providing them with immunocytes. According to Bykova V.P. (1998), the palatine tonsils act as a center organizing natural resistance and specific immune protection of the respiratory tract and oropharynx [5,6,7,8].

References:

1. Kudratova Z. E. et al. Current modern etiology of anemia //Open Access Repository. – 2023. – Т. 10. – №. 10. – С. 1-4.

2. Burxanova D. S., Umarova T. A., Kudratova Z. E. Acute myocarditis linked to the administration of the COVID 19 vaccine //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 11. – С. 23-26.

3. Кудратова З. Э. и др. Атипик микрофлора этиологияли ўткир обструктив

бронхитларининг ўзига хос клиник кечиши //Research Focus. - 2022. - Т. 1. - №. 4. - С. 23-32.

4. Kudratova Z. E, Normurodov S. Etiological structure of acute obstructive bronchitis in children at the present stage - Thematics Journal of Microbiology, 2023. P.3-12.

5. Kudratova Z. E., Tuychiyeva S. K. Atipik mikroflora etiologiyali o'tkir obstruktiv bronxitlar etiopatogenezining zamonaviy jixatlari. Research Focus, 2023, B. 589-593.

6. Kudratova Z. E., Karimova L. A. Age-related features of the respiratory system. Research Focus,Tom 2, P. 586-588.

7. Исомадинова Л. К., Даминов Ф. А. Современная лабораторная диагностика хронического пиелонефрита у детей //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 112-116.

8. Isomadinova L. K., Daminov F. A. Glomerulonefrit kasalligida sitokinlar ahamiyati //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 117-120.

9. Isomadinova L. K., Qudratova Z. E., Shamsiddinova D. K. Samarqand viloyatida urotiliaz kasalligi klinik-kechishining o'ziga xos xususiyatlari //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 10. – С. 51-53.

10. Isomadinova L. K., Qudratova Z. E., Sh B. F. Virusli gepatit b fonida Covid-19 ning klinik laborator kechish xususiyatlari //Journal of new century innovations. – 2023. – Т. 30. – №. 3. – С. 60-65.

11. Isomadinova L. K., Yulayeva I. A. Buyraklar kasalliklarning zamonaviy diagnostikasi //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 10 Part 3. – С. 36-39

12. Kudratova Zebo Erkinovna, Tamila Abdufattoevna Umarova, & Sirojeddiova Sanobar. (2024). Modern types of immunoenzyme analysis methods old problems. Web of Discoveries: Journal of Analysis and Inventions, 2(6), 67–70.

13.Даминов Ф. А. и др. Хирургическая тактика лечения диффузно-токсического зоба //Академический журнал Западной Сибири. – 2013. – Т. 9. – №. 1. – С. 21-21.

14.Даминов Ф. А., Хурсанов Ё. Э., Карабаев Х. К. Наш опыт профилактики и лечения полиорганной недостаточности у тяжелообожженных //Research Focus. – 2022. – Т. 1. – №. 3. – С. 143-151.

15.Даминов Ф. А. и др. Синдром кишечной недостаточности и его коррекция у тяжелообожженных //Журнал Неотложная хирургия им. ИИ Джанелидзе. – 2021. – №. S1. – С. 20-21.

16.Даминов Ф. А., Карабаев Х. К., Хурсанов Ё. Э. Принципы местного лечения ожоговых ран у тяжелообожженных (Обзор литературы) //Research Focus. – 2022. – Т. 1. – №. 3. – С. 133-142.

17.Даминов Ф. А. Анализ результатов хирургического лечения больных узловыми образованиями щитовидной железы //research focus. – 2022. – Т. 1. – №. 2. – С. 120-124.

18.Даминов Ф. А. и др. Особенности лечебного питания для ранней профилактики желудочнокишечных осложнений у обожженных //Журнал Неотложная хирургия им. ИИ Джанелидзе. – 2021. – №. S1. – С. 21-21.