



HISTOLOGY OF IMMUNE SYSTEM ORGANS

Azizbek Komiljonov

Fozilkhon Shukurullokhonov

Jamshid Kamilov

Gulasal Ernayeva

Tashkent State Medical University, Tashkent Uzbekistan

Abstract

The immune system consists of complex structures that protect the body from external and internal pathogenic factors. This article provides a comprehensive analysis of the histological structure of immune system organs, their functional characteristics, and their role in the formation of immunity. Special attention is given to the microscopic structure of central immune organs (thymus and bone marrow) and peripheral immune organs (spleen, lymph nodes, Peyer's patches, and tonsils).

Keywords: Immune system, thymus, spleen, lymph nodes, Peyer's patches, immunity, histology.

Introduction

The Immune System: Structure and Function

The immune system is a complex biological network that protects the body from infections, viruses, and foreign cells. It is responsible for generating immune responses and clearing antigens from the body. The organs of the immune system are divided into two main groups:

1. Central (Primary) Immune Organs:

- **Thymus and Bone Marrow** – Sites where lymphoid cells mature and differentiate.



2. Peripheral (Secondary) Immune Organs:

- **Spleen, Lymph Nodes, Peyer's Patches, and Tonsils** – Organs that facilitate the interaction of mature immune cells with antigens, triggering targeted immune responses.

Materials and Methods

To investigate the histological structure of immune system organs, an experimental study was conducted using the following methods:

- **Histological Sample Preparation:** Tissue sections from immune organs were collected and stained using standard histological dyes, including hematoxylin and eosin (H&E).
- **Microscopic Analysis:** The microscopic architecture of the prepared histological samples was examined.
- **Statistical Analysis:** Samples from organisms of different age groups were compared to observe age-related changes in immune organ structure.

Results

The study identified the histological structures and functional characteristics of key immune organs:

1. Thymus

- Samples from individuals aged 1 to 20 years showed dense lymphocyte populations in the cortex and prominent Hassall's corpuscles (clusters of epithelial cells).
- After the age of 40, thymic involution was observed, with partial replacement of lymphoid tissue by adipose tissue, indicating reduced functional activity.

2. Bone Marrow

- Active in young organisms, with clearly visible differentiation of lymphoid cells.
- In older samples, an increase in adipose tissue within the bone marrow was noted, reflecting decreased hematopoietic function.



3. Spleen

- In younger organisms, the white pulp contained numerous lymphoid follicles, with high counts of T and B lymphocytes.
- The red pulp showed active erythrocyte breakdown, indicating ongoing blood filtration and immune response.

4. Lymph Nodes

- In young samples, the cortical zones had high B-lymphocyte activity, while the paracortical zones were rich in T-lymphocytes.
- In older individuals, a decrease in the number of follicles was observed, suggesting reduced immune response.

5. Peyer's Patches

- Located in the intestinal wall, these structures exhibited increased lymphoid tissue with higher antigen exposure.
- After age 50, a decline in Peyer's patch activity was noted, indicating reduced gut immune function.

The analysis confirmed that the structure and function of immune system organs change significantly with age, emphasizing their critical role in maintaining the body's defense mechanisms.

Conclusion

The histology of immune system organs is fundamental to understanding the mechanisms of immunity and the body's ability to defend against infections, pathogens, and foreign cells. Central immune organs, such as the thymus and bone marrow, play a crucial role in the maturation and differentiation of lymphoid cells, while peripheral organs like the spleen, lymph nodes, Peyer's patches, and tonsils facilitate the activation and proliferation of mature immune cells in response to antigens.

Age-related changes significantly impact the structure and function of these organs, affecting overall immune competence. For instance, thymic involution and increased adipose tissue in bone marrow reduce lymphocyte production,



while alterations in spleen architecture and Peyer's patch activity can compromise immune surveillance and response. Understanding these histological changes is essential for diagnosing immunodeficiency disorders and developing effective treatment strategies.

Overall, detailed histological analysis provides valuable insights into the dynamic nature of the immune system and its critical role in maintaining health throughout the lifespan.

References

1. Junqueira, L. C. va Carneiro. J. (2013). "Basic Histology: Text and Atlas" McGraw-Hill.
2. Abbas. A. K. Lichtman. A. H. va Pillai. S. (2017). "Cellular and Molecular Immunology". Elsevier.
3. Kumar. V. , Abbas. A. K. , Aster. J. C.(2018). "Robbins and Cotran Pathologic Basis of Disease". Elsevier.
4. Paul. W. E. (2012)."Fundamental immunology". Lippincott Williams va Wilkins.
5. Owen. J. A. , Punt. J. va Stranford. Sh. A. (2019). "Kuby Immunology". Macmillan Learning
6. Шайхова, Г. И., Отажонов, И. О., & Рустамова, М. Т. (2019). Малобелковая диета для больных с хронической болезнью почек. *Экспериментальная и клиническая гастроэнтерология*, (12 (172)), 135-142.
7. Отажонов, И. О. (2010). Характеристика фактического питания и качественный анализ нутриентов в рационе питания студентов высших учебных заведений. *Врач-аспирант*, 43(6.2), 278-285.
8. Отажонов, И. О., & Шайхова, Г. И. (2020). Фактическое питание больных с хронической болезнью почек. *Медицинские новости*, (5 (308)), 52-54.
9. Islamovna, S. G., Komildjanovich, Z. A., Otaboevich, O. I., & Fatihovich, Z. J. (2016). Characteristics of social and living conditions, the incidence of patients with CRF. *European science review*, (3-4), 142-144.
10. Отажонов, И. О. (2011). Заболеваемость студентов по материалам углубленного медосмотра студентов, обучающихся в высших учебных



-
- | | | | |
|-------------|---------|---------|------------|
| заведениях. | Тошкент | тиббиёт | академияси |
|-------------|---------|---------|------------|
- Ахборотномаси. *Тошкент*, (2), 122126.
11. Каримов, М. М., Зуфаров, П. С., Собирова, Г. Н., Каримова, Д. К., & Хайруллаева, С. С. (2023). Комбинированная терапия гастроэзофагеальной рефлюксной болезни при коморбидности с функциональной диспепсией. *Экспериментальная и клиническая гастроэнтерология*, (3), 41-45.
 12. Karimov, M. M., Zufarov, P. S., & Sobirova, G. N. (2023). Evaluation of the Effectiveness of Eradication Therapy Based on Potassium-Competitive Acid Blockers in Patients with Helicobacter Pylori Associated Chronic Gastritis. *Journal of Coastal Life Medicine*, 11, 1481-1483.
 13. Zufarov, P., Karimov, M., & Sayfiyeva, N. (2023). EVALUATION OF THE EFFECTIVENESS OF GASTRITIS IN THE TREATMENT OF FUNCTIONAL DYSPEPSIA. *Евразийский журнал медицинских и естественных наук*, 3(1 Part 1), 116-121.
 14. Zufarov, P., Karimov, M., & Abdumajidova, N. (2023). CORRECTION OF PSYCHOEMOTIONAL STATUS IN GASTROESOPHAGEAL REFLUX DISEASE. *Евразийский журнал академических исследований*, 3(1 Part 3), 67-72.
 15. Каримов, М. М., Рустамова, М. Т., Собирова, Г. Н., Зуфаров, П. С., & Хайруллаева, С. С. (2023). Оценка эффективности К-КБК вонопрозраза в комплексе эрадикационной терапии у больных с хроническими Нр-ассоциированными гастритами. *Экспериментальная и клиническая гастроэнтерология*, (12 (220)), 54-58.
 16. Давлетьянц, Г. Л., Нуритдинова, Н. Б., Зуева, Е. Б., & Усманов, Р. И. (2000). Клиническая и гемодинамическая эффективность небиволола у больных с гипертонической болезнью и сердечной недостаточностью. *Кардиология*, 40(12), 64.
 17. Абдуллаев, С. П., Бендингер, М. Н., Юлдашева, Х. Ю., Нуритдинова, Н. Б., & Шукурджанова, С. М. (2010). Особенности лечения артериальной гипертензии у лиц пожилого возраста. *Кардиология Узбекистана. Ташкент*, (2-3), 17.
 18. Ярмухамедова, Д. З., Нуритдинова, Н. Б., Шоалимова, З. М., Махмудова, М. С., & Ибрагимов, З. С. (2021). РАСПРОСТРАНЕННОСТЬ
-



-
- АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ И ФАКТОРОВ РИСКА У ЛИЦ МОЛОДОГО ВОЗРАСТА. *Наука, техника и образование*, (3 (78)), 60-63.
19. Mahmudova, M. S., Shukurdjanova, S. M., & Nuritdinova, N. B. (2022). Complications of Parkes Weber syndrome.
20. Абдумаликова, Ф. Б., Нуриллаева, Н. М., Нуритдинова, Н. Б., & Шукурджанова, С. М. (2021). Влияние пандемии COVID-19 на поведенческие и психосоциальные факторы риска кардиоваскулярных заболеваний.
21. Искандарова, Г. Т. (2006). Морфофункциональное состояние дыхательной системы юношей 18-27-летнего возраста, проживающих в условиях Узбекистана. *Гигиена и санитария*, (3), 72-75.
22. Искандарова, Г. Т. (2000). Меры профилактики при применении нового пестицида ХС-2. *Бюллетень Ассоциации врачей Узбекистана. Ташкент*, (1), 56-58.
23. Искандарова, Г. Т., Эшдавлатов, Б. М., & Юсупова, Д. Ю. (2016). САНИТАРНО-ЭПИДЕМИОЛОГИЧЕСКОЕ ЗНАЧЕНИЕ ПОЧВЫ НАСЕЛЕННЫХ МЕСТ РЕСПУБЛИКИ УЗБЕКИСТАН. *Современные тенденции развития науки и технологий*, (1-3), 46-48.
24. Искандарова, Г. Т. (2007). Закономерности и особенности морфофункционального развития, физических способностей юношей призывного возраста.
- .