GOSPODARKA I INNOWACJE

LABORATORIUM WIEDZY Artur Borcuch

Volume: 22 | 2022

ISSN: 2545-0573

MORPHOMETRIC INDICATORS OF STRUCTURAL AND FUNCTIONALTHYMUS ZONES IN THE DYNAMICS OF TEMPERATURE EXPOSURE

Davronov Raxmon Davronovich

Department of Histology, Cytology and Embryology BukhGosMI, Bukhara, Uzbekistan

ARTICLEINFO.

Key words:
Immunity, lymphocyte, thymus.

Resume

Morphometric method was used to determine changes in the parameters of cortical, cortico-medullary and medullary zones of the thymus of white laboratory female rats in the dynamics of temperature exposure. The most pronounced changes in the indicators of these zones are observed on the 5th-7th day of the experiments, conditionally called by us the period of pronounced rearrangements of the thymus.

One of the topical issues of morphometric science is the response of organs and tissues to various endogenous and exogenous influences. This problem is more relevant in the environmentally unfavorable conditions of our region, where dry and hot weather lasts for a relatively long time.

Material and research methods

The experiments were carried out on white mature outbred male rats with an initial weight of 150-170 grams, which were on a normal laboratory diet. Prior to the experiments, 10 rats under ether anesthesia, under sterile conditions, underwent laparotomy for the purpose of macroscopic examination of all internal organs and lymphoid formations of the gastrointestinal tract. These studies have shown that almost all organs of the chest and abdominal cavities are in normal condition.

The experimental animals were divided into two groups.

The first group consisted of 42 intact rats. The second group is experimental (118 rats).

They were transferred for 1 hour to the conditions of exposure to the dry hot climate of the Bukhara region by keeping them on the street, with direct sunlight. Moreover, all experiments were carried out in the summer season at a temperature regime of +390 +430C. The animals were kept under normal laboratory conditions.

Experimental and control animals were slaughtered under ether anesthesia, by decapitation, on an empty stomach, 3,6,12,24 hours, 3,5,7,14,21 days after temperature exposure[1 , 3 , 4 , 5].

Pieces of thymus served as material for research.

For light-optical studies, the materials were fixed in 12% formalin, in Bouin's liquid. Pieces of organs

after appropriate treatment were embedded in paraffin. Deparaffinized sections were stained with hematoxylin-eosin.

In the dynamics of the experiment, we calculated the cellular composition of the cortical, corticomedullary and medullary zones of the thymic lobules per 1000 cells. The data obtained were expressed in%.

Morphometric studies were carried out according to the method of G. G. Avtandilov (1972), a method modified by us. The obtained digital data were expressed in relative units (relative units) and as a percentage. All digital data were processed by the method of variation statistics according to Fisher - Student in the modification of V.Montsevichyute - Ehringen (1964). Mathematical processing of the morphological data obtained during the study was carried out directly from the general matrix of the Microsoft Office data package "Excel 7.0" on a personal computer Pentium - IV using the capabilities of the "STTGRAPH 5.1" program, the indicators of standard deviation and representativeness errors were determined. Differences satisfying $P<0.05$ were considered significant.

Results of own research and their discussion

As our studies have shown, the thymus gland of intact and control rats does not differ from each other in terms of morphofunctional parameters. As shown by our morphological studies, the thymus of intact rats has the same structural and functional zones as in other mammals. The thymic lobules are divided into cortical, corticomedullary, and medullary zones. The thymic lobules are separated from each other by a well-developed connective tissue septum with well-developed blood vessels.[11,13,14,15,16].

When morphometry slices of the thymus found that 71% is the area of the cortical, 26% - medullary zone and 3% falls on the share of the connective tissue of the stroma.

When counting cells per unit area of the cortical zone of control animals, small and medium lymphocytes are predominant, which is 248.5±3.7 rel. units (Table No. 1). The number of lymphoblasts in the cortical zone - 72.1±1.8, reticuloepithelial cells - 13.7±1.7 rel. units The cells of the system of mononuclear phagocytes make up a small proportion - 0.9±0.05 rel.un. (all items combined).

Tab. № 1. Cytogram of the cortical zone in the dynamics of experiments (number of cells per unit area).

Timing research	Lymphoma cytes you (small, medium	Lymph blasts	Reticuloendothelial nutrient cells	monocytogenes similar cells	macrophages	Total
Контроль	248,5±3,7	72,1±1,8	13,7±1,7	0,2±0,03	0,7±02	335,6±4,9
1с	146,8±1,3*	78,7±0,7*	15,4±0,3	2,3±0,1*	3,0±0,1*	246,2±1,6*
3с	109,8±3,3	8,23±0,9*	18,3±0,2*	2,1±0,1*	3,1±0,1*	215,5±4,6*
5с	142,3±3,5*	79,7±0,3*	21,3±0,5*	4,1±0,2*	4,1±0,1*	251,4±2,6*
7с	220,7±0,6*	76,1±0,4	16,6±0,3	3,1±0,1	4,4±0,2	220,9±1,1
14с	145,7±2,7*	78,2±1,1*	18,5±0,3*	1,5±0,2*	2,5±0,2*	246,5±2,9*
21с	197,6±2,9*	81,3±1,1*	22,9±0,5*	0,5±0,1	0,9±0,1	303,1±0,9*

In the medullary zone of the thymus, firstly, the cell density per unit area is approximately 2 times less than in the cortical zone (174.1±2.3 versus 335.6±4.9 rel. units). As shown in Table. No. 2, the number of reticuloepithelial cells and cells of the mononuclear phagocyte system in the medullary zone practically does not differ from the indicators of the cortical zone.[6,7,8,9,10].

Tab. №2. Cytogram of the medullary zone of the thymus in the dynamics of experiments (number of cells per unit area)

Timing research	Lymphomacytes you (small, medium	Lymph blasts	Reticuloendothelial nutrient cells	monocytogenes similar cells	macrophages	Total
The control	107,0±2,4	0,3±0,02	56,5±0,3	6,3±0,2	4,I±0,I	I74,I±2,3
1c	II2,6±2,I	I,3±0,I^{+}	6,70±0,4^{+}	2,2±0I^{+}	2,4±0,2^{+}	185,5±2,3^{+}
3c	94,8±0,3^{+}	2,0±0,I^{+}	59,6±0,4^{+}	3,I±0,I^{+}	3,I±0,I^{+}	I62,7±0,7^{+}
5c	I20,8±I,I^{+}	4,7±0,2^{+}	53,0±0,3^{+}	3,7±0I^{+}	3,6±0,I^{+}	I86,6±I,6^{+}
7c	I38,9±0,8^{+}	2,I±0,I^{+}	52,8±0,4^{+}	3,5±0,2^{+}	3,6±0,2^{+}	20I,0±I,3^{+}
14c	III,8±2,0	I,I±0,I^{+}	59,7±0,7^{+}	3,9±0,2^{+}	3,9±0,I^{+}	I80,4±I,6^{+}
21c	II0,I ±0,9	I,I±0,07^{+}	6I,9±0,9^{+}	5,4±0,3^{+}	4,6±0,2^{+}	I84,0±2,I

When calculating the cytogram of the cortico-medullary zone, the intermediate position of this zone in comparison with the indicated zones of the thymus attracts attention.

Thus, the thymus gland of white laboratory rats has the same structural and functional zones found in the thymus of other mammals. However, the density and content of cells in them has certain specific features.

Comprehensive studies of the thymus in the dynamics of experiments made it possible to identify certain periods of these changes:

- ✓ period of early changes - up to 3 days of experiments;
- ✓ a period of pronounced structural and functional rearrangements organ - 5-7 days of research;
- ✓ Period of long-term results - 14 - 21 days of experiments.

In the period of early changes, certain shifts in the quantitative and qualitative indicators of various structural zones of the thymus gland are revealed. As shown by morphological studies, the blood vessels of the thymus lobules, especially the interlobular septa, are sharply dilated, and blood stasis is noted in them. All this leads to an increase in the area occupied by the connective tissue structures of the thymus. [12, 16].

One of the characteristic features of early changes is a decrease in the number of small and medium lymphocytes in the cortical zone of the thymus. As can be seen from Table. No. 1, the number of small and medium lymphocytes on the 3rd day of experiments decreases to 109.8±3.5 compared to 248.5±3.7 relative units in the control. The number of lymphoblasts on the 1st-3rd day gradually increases, reaching a maximum on the 3rd day, amounting to 82.3±0.9 compared to 72.1±1.8 in the control. The number of reticuloepithelial cells on the 3rd day reaches 18.3±0.2 (in the control 13.7±1.7 relative units). The number of cells of the system of mononuclear phagocytes in the early period also actively increases.

Certain quantitative changes in cells are also detected in the corticomedullary zone of the thymus. This consists in a decrease in the number of small and medium-sized lymphocytes, an increase in the number of lymphoblasts, reticuloepitheliocytes and cells of the mononuclear system.

In the medullary zone in the period of early changes, no pronounced quantitative shifts of cells are detected.

In the medullary zone of the thymus, the density of thymocytes decreases compared to the indicated periods of the study. It is dominated by reticulo-epithelial cells in contact with lymphocytes. Moreover, reticuloepithelial cells and macrophages are hypertrophied, their wide cytoplasm is rich in granules,

they are in contact with numerous lymphocytes.

Conclusion

1. Morphological and functional rearrangements of the thymus during the impact of adverse environmental factors in the Bukhara region are characterized by certain dynamics, including periods of early changes, pronounced immunomorphological rearrangements and long-term results.
2. Each of these periods is characterized by structural, functional and quantitative features, which together determine the essence of adaptive responses of the thymus in response to temperature exposure.
3. The period of early changes is characterized by a decrease in the number of small and medium-sized lymphocytes of the thymus cortex, leading to a decrease in the areas of these zones, an increase in the number of proliferating cells in the cortical and corticomedullary zones, disorders of the vessels of the microvasculature in almost all structural zones of the thymus;
4. The period of pronounced immunomorphological rearrangements is characterized by hypertrophy of thymic stromal and SMF cells, hyperplasia of thymocytes in almost all zones, activation of thymic lobule cells, increased proliferative activity of thymus cells;
5. The period of long-term results is characterized by a tendency towards the normalization of qualitative and quantitative changes in the components of the thymus gland.

However, the tension of subcellular structures of immunocompetent cells is still preserved, there is an increase in the number and functional activity of stromal mechanocytes-fibroblasts, reticulo-epithelial cells.

List of used literature

1. Davronova, S. R. (2020). ULTRASTRUCTURAL FEATURES OF THYMUS CELLS OF WHITE LABORATORY RATS IN THE DYNAMICS OF TEMPERATURE EXPOSURE. A new day in medicine, (4), 634-635.
2. Davronov, R. D., &Davronova, S. R. (2020). STRUCTURAL AND FUNCTIONAL CHANGES OF THE BONE MARROW IN THE DYNAMICS OF ANTIGENIC EXPOSURE (experimental salmonellosis). A New Day in Medicine, (1), 487-489.
3. Davronov, R. D., &Davronova, S. R. (2008). Structural and functional features of adaptive changes in the organs of the immune system under antigenic influence. Morphology, 133(2), 38c-38c.
4. Khasanova, M. T.,&Toykulovna–Assistant, K. M. MORPHOFUNCTIONAL CHANGES OF THE GASTROINTESTINAL TRACT DURING CHRONIC ALCOHOLISM.
5. Azimova, S. (2021). THE INFLUENCE OF MOTHER'S EXTRAGENITAL PATHOLOGY ON THE FORMATION OF THYMUS OF THE PROCESSING IN THE EARLY POSTNATAL ONTOGENESIS. *The Scientific Heritage*, (81-2), 44-46.
6. Azimova, S. B. (2021). Morphofunctional Characteristic of thymus under exposure to various environmental factors. *An International Multidisciplinary Research Journal*, *11*(3), 2.
7. Khaitov P.M. Immunomodulators: mechanism of action and clinical application / R.M.Khaitov, B.V.Pinegin // Immunology. 2003. - No. 4. - pp. 196-202.
8. B.B. Khasanov. Structural and functional features of immunocompetent breast cells glands during pregnant and lactation in chronic hepatitis . / Khasanov B.B. // Pcyhology and education − 2021. – v 58, №02 −P. 8038-8045.
9. Sh, D., Kharibova, E., &Davronov, R. (2021). Ultrastructural features of the white thymus stromal cells. The Scientific Heritage, (79-2), 29-30.

10. Davronova, S. R. (2020). THE STRUCTURE OF THE THYMUS OF WHITE RATS UNDER THE INFLUENCE OF THE TEMPERATURE FACTOR. Morphology, 157(2-3), 67-67.
11. Rakhmatovna, A. G. (2021). Efficiency of PDT in severe cervical dysplasia. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2566-2568.
12. Davronovich, D. R., &Rahmonovna, D. S. MODERN VIEWS ON THE PARTICICPATION OF THE THYMUS IN THE PROCESSES OF IMMUNOGENESIS
13. Furqatovich, U. S. (2022). COGNITIVE IMPAIREMENT UNDER THE HEART FAILURE. International Journal of Philosophical Studies and Social Sciences, 2(2), 167-171.
14. Nazarova, F. I. (2022). SOG'LOM FARZAND OILA QUVONCHI. *Scientific progress*, *3*(2), 1010-1015.
15. Назаров, А. И. (2022). COVID-19 БИЛАН КАСАЛЛАНГАН БЕМОРЛАРНИНГ БОЛАЛАРНИНГ КЛИНИК ВА ЭПИДЕМИОЛОГИК ХУСУСИЯТЛАРИ. *Scientific progress*, *3*(2), 1026-1031.
16. Nazarov, A. I. (2022). CONSEQUENCES OF SEIZURES AND EPILEPSY IN CHILDREN. *Web of Scientist: International Scientific Research Journal*, *3*(02), 483-489.
17. Nazarov, A. (2018). THE GLOBALIZING WORLD: THE CONDITIONS AND PREREQUISITES FOR POLITICAL DEVELOPMENT THROUGH INNOVATIVE POLITICS AND PREVENTIVE DEMOCRACY. *Theoretical & Applied Science*, (4), 9-12.
18. Nazarova, F. I. (2022). ABU ALI IBN SINONING SOG ‘LOM TURMUSH TARZINI SHAKILANIRISHI HAQIDA. *Scientific progress*, *3*(1), 1137-1142.
19. Nazarov, A. I. (2022). ATROF-MUHITNING INSON SALOMATLIGIGA TA’SIRI. *Scientific progress*, *3*(1), 881-885.
20. Назаров, А. И. (2022). АУТИЗМКАСАЛЛИКИНИЭРТААНИҚЛАШДАВАДАВОЛАШДАДАВОЧОРАЛАРИНИИ ШЛАБЧИҚАРИШВАДАВОСАМАРАДОРЛИГИНИОШИРИШ. *Scientific progress*, *3*(1), 1143-1152.
21. Nazarova, F. I. R. U. Z. A. (2021). The use of phenological observations in the determination of the main phases of the development of thin-fiber goose varieties in the conditions of Bukhara region. *Theoretical & applied science Учредители: Теоретическаяприкладнаянаука,(9)*, 523-526.
22. [22] NAZAROVA, F. (2022). CREATION OF FINE-FIBER COTTON VARIETIES IN THE CONDITIONS OF THE BUKHARA REGION. *International Journal of Philosophical Studies and Social Sciences*, *2*(2), 50-54.
23. Nazarova, F., &Hudaikulova, N. (2019). Healthy generation-the basis of a healthy family. *Scientific Bulletin of Namangan State University*, *1*(7), 69-73.
24. Nazarova, F. (2022). Qaridoshlar orasidagi ofat. *Scientific progress*, *3*(1), 663-669.
25. Мухидова, Г. Х. (2021). Феномен «компьютерной зависимости: особенности интернетзависимости у подростков». Eurasian journal of medical and natural sciences, 22-26.
26. Мухидова Г.Х. “Zamonaviyta’lim: muammovayechimlari”. Особенности антропометрических параметров компьютерно-зависимых подростков мальчиков. 2021г стр 49-50.
27. Худойкулова, Н. И. (2018). Пути воспитания толерантности у молодежи. *Наука, техникаиобразование*, (11 (52)), 98-100.
28. Boymurodova M.N. (2021). Comparative Characteristics of Mucous Membrane of Various Parts of

Rectum Of Rat// INTERNATIONAL JOURNAL ON ORANGE TECHNOLOGIES, April 2021 P 157-162.

29. Давронов, Р. Д. (2022). МОРФО-ФУНКЦИОНАЛЬНАЯ ХАРАКТЕРИСТИКА ОРГАНОВ ИММУНИТЕТА ПРИ АНТИГЕННОМ ВОЗДЕЙСТВИИ. *Scientificprogress*, *3*(2), 540-545.
30. Давронова, Ш. Р. (2022). НОВЫЕ ВЗГЛЯДЫ ОБ УЧАСТИИ ТИМУСА В ПРОЦЕССАХ ИММУНОГЕНЕЗА. *Scientific progress*, *3*(2), 546-551.
31. Khasanova, M. T. HISTOPATHOLOGICAL CHANGES IN STRUCTURE OF KIDNEY UNDER THE CONSUMPTION OF ENERGYDRINKS IN RATS.InternationalJournal of Philosophical Studies and Social Sciences, 2(2), 167-171.