


<p> ОҢТҮСТІК ҚАЗАҚСТАН MEDISINA AKADEMIASY «Оңтүстік Қазақстан медицина академиясы» АҚ </p>		<p>  SKMA -1979- MEDICAL ACADEMY АО «Южно-Казахстанская медицинская академия» </p>
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METHODOLOGICAL GUIDELINES FOR PRACTICAL CLASSES

Discipline: "Normal blood and lymph"

Discipline code : NBL 2210


OP name: 6B10115 –“Medicine”

Amount of study hours (credits): 15/0.5

Course and semester of study: 2/3

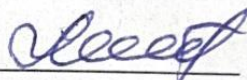
Practical training: 4 hours

Shymkent, 2024

<p> ОҢТҮСТІК ҚАЗАҚСТАН MEDISINA AKADEMIASY «Оңтүстік Қазақстан медицина академиясы» АҚ </p>		<p>  SOUTH KAZAKHSTAN MEDICAL ACADEMY АО «Южно-Казахстанская медицинская академия» </p>
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The guidelines for practical training were developed in accordance with the working curriculum of the discipline (syllabus) "Normal blood and lymph" and discussed at a meeting of the department of «Topographic anatomy and histology»

Protocol No. 1 from "03" 09 2024

Head of the department, c.m.s., acting professor  Murzanova D.A.

Lesson No. 1

1. The theme: Blood and lymph 1.

2. Purpose:

Learn:

- To give a morphofunctional characterization of blood as tissue.
- Distinguish in the preparation of a blood smear stained with azur II and eosin, erythrocytes, platelets
- Cytofunctional features of erythrocytes and blood plates.

3. Learning objectives: Knowledge of blood morphology is necessary for a doctor of any profile. Blood is a tissue that reacts quickly to deviations in the physiological state of the body. Studies of the quantitative composition of shaped blood elements and their tinctorial signs are widely used in clinical practice.

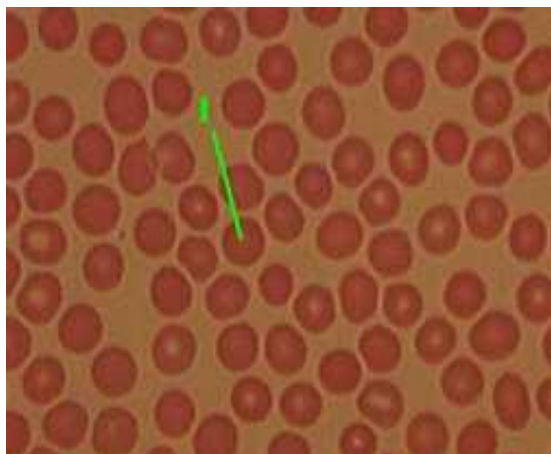
4. The main issues of the topic:

1. Histogenesis and morphofunctional features of tissues of the internal environment.
2. Characteristics of blood as tissue.
3. Morphology and function of shaped blood elements.
4. An idea of the hemogram and leukocyte formula, their age and sexual characteristics.
5. The composition of the lymph.

Handout material.

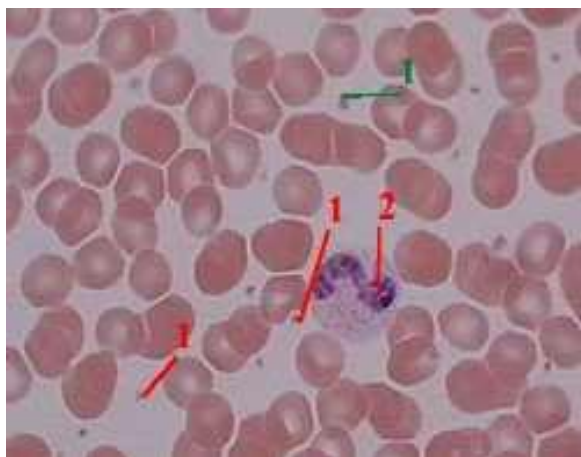
1. Microscopes
2. Micro-preparations for the study

A smear of human blood. Romanovsky coloring.



The drug is a blood smear: red blood cells in the smear. Romanovsky coloring.

1. a) On preparations, the main part of the shaped blood elements is represented by erythrocytes.
b) Therefore, in this field of view, we do not see any other cells except red blood cells.
2. They differ in characteristic morphology:
 - a) they are devoid of nuclei,
 - b) they have a rounded shape and a relatively constant diameter,
 - c) they are colored pink with eosin,
 - d) they are lighter in the center, which is explained by the shape of the cells - in the form of a biconcave disk.



1. Here we see several platelets (1) and a rod-shaped neutrophil (2).
2. The central parts of platelets (granulometers) are more basophilic than the peripheral ones (hyalomers)

Function: transport, hemocoagulation.

5. The main forms/ methods/ technologies of training to achieve the LO discipline: working in small groups, filling out a checklist of histological preparations and microphotographs.

6. Types of control to assess the level of achievement of the LO discipline: the checklist for evaluating the practical lesson.

7. Literature.

Main literature

1. Inderbir Singh. Textbook of Human Histology. With Color Atlas and Practical Guide/8th Edition. Jaypee Brothers Medical Publishers .2016.-302 p. Перевод Гистология человека
2. Dudek Ronald W. Embryology / Ronald W. Dudek. - 5th ed. - [s. l.] : Wolters Kluwer, 2014. - 158 p. Перевод заглавия: Эмбриология
3. Gartner Leslie P. Cell Biology and Histology / Leslie P. Gartner. - 8th ed. - [s. l.] : Wolters Kluwer, 2019. - 436 p. - (BRS. Board Review Series) Перевод заглавия: Клеточная биология и гистология


Additional literature

Textbook of Human Histology. Inderbir Singh /Sixth Edition/ Inderbir Singh 2010.-386 p.

Перевод Учебник по гистологии человека

Electronic publications

1. ATLAS OF HISTOLOGY with Functional Correlations. Thirteenth Edition, Wolters Kluwer. 2017.- 1102 p.
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6. Бородулина, О.В. Цитология и гистология – Cytology and histology : Практикум. / Костанайский гос. педагогический университет им. У. Султангазина. - Костанай: КГПУ им.У.Султангазина, 2020. - 100 с. - <http://rmebrk.kz/>

8. Control


Questions

Questions


1. What is a hemogram and what is it in a healthy person?
2. What are the morphological and chemical characteristics of erythrocytes and blood platelets (platelets)?

Tests

1. Identify the cells that make up 0.5% of the total number of leukocytes, have an S-shaped curved nucleus, metachromatically colored granules in the cytoplasm:
 - A) basophils
 - B) neutrophils
 - C) Eosinophils
 - D) monocytes
 - E) lymphocytes
2. Histochemical examination of leukocytes in a blood smear reveals cells in the cytoplasm of which there are granules containing histamine and heparin. Identify the cells:
 - A) monocytes
 - B) neutrophils
 - C) Eosinophils
 - D) basophils
 - E) Red blood cells
3. Clusters are detected in the preparation of human red bone marrow. Identify the shaped elements of blood that are formed from giant cells located in close contact with sinusoidal capillaries:
 - A) white blood cells
 - B) red blood cells
 - C) platelets
 - D) monocytes
 - E) lymphocytes
4. A mixture of microorganisms has been introduced into a test tube containing leukocyte mass. Identify the cells in the cytoplasm of which phagocytic microbes will be detected:
 - A) lymphocytes and neutrophils
 - B) lymphocytes and basophils
 - C) lymphocytes and eosinophils
 - D) monocytes and lymphocytes
 - E) neutrophils and monocytes
5. In a blood smear stained according to Romanovsky-Giemsa, 20% of large (20 microns in diameter), rounded cells with a weakly basophilic cytoplasm and a bean-shaped nucleus are observed. Clinically, this phenomenon is characterized as:
 - A) monocytosis
 - B) lymphocytosis
 - C) leukopenia

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- D) neutrophilosis
- E) reticulocytosis
- 6. A blood test in a patient with a parasitic disease (helminthic invasion) revealed an increase in blood:
 - A) basophils
 - B) monocytes
 - C) Eosinophils
 - D) red blood cells
 - E) lymphocytes
- 7. Lymphocytes with cytotoxic function are:
 - A) T - helpers
 - B) T -suppressors
 - C) T – killers
 - D) Memory T cells
 - E) B lymphocytes
- 8. The main function of basophils is:
 - A) production of histamine and heparin
 - B) antibody production
 - C) destruction of histamine
 - D) collagen secretion
 - E) phagocytosis of microbes
- 9. The main function of neutrophils is:
 - A) oxygen transport
 - B) collagen synthesis
 - C) antibody production
 - D) phagocytosis
 - E) Histamine synthesis
- 10. Leukocytosis – ... the number of leukocytes in the blood
 - A) Increase
 - B) reduction
 - C) increased destruction
 - D) changing the ratio
 - E) the appearance of immature forms
- 11. The place of death of old red blood cells:
 - A) kidney parenchyma
 - B) thymus gland
 - C) red pulp of the spleen of the kidney parenchyma
 - D) vascular bed
 - E) lymph nodes
- 12. Blood cells capable of synthesizing immunoglobulins:
 - A) B lymphocytes
 - B) T - lymphocytes
 - C) monocytes
 - D) eosinophils
 - E) basophils

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Tasks

1. When calculating the leukocyte formula, leukocytes with a sharply rounded basophilic nucleus were found in an adult blood smear, around which there is a narrow rim of light blue cytoplasm. Their relative number was 40%. What are these shaped elements? Does their number correspond to the norm?
2. When calculating the leukocyte formula, 5% of leukocytes with a bean-shaped nucleus and a light cytoplasm containing barely distinguishable oxyphilic granules were found in an adult blood smear. Leukocytes similar to them, but with a rod-shaped nucleus, made up 10%, and with a segmented nucleus-45%. What kind of leukocytes are these? Does their number correspond to the norm? What is the name of such a ratio of these cell types in the clinic?
3. When calculating the leukocyte formula, about 60% of lymphocytes and 30% of neutrophil granulocytes were found in the child's blood smear. How would you rate such a result? Please comment on the response.
4. The blood of the inhabitants of the highlands and plains is examined. What differences in the hemogram should be expected?
5. The blood test revealed 63% neutrophils, 9% eosinophils, 22% lymphocytes and 6% monocytes. Does the leukocyte formula correspond to the norm? If not, what are the possible causes of its change?
6. $2.5 \times 10^{12}/l$ of erythrocytes and 12% of reticulocytes were found in the patient's blood. What terms do the clinic use to describe such a blood picture? What are the possible reasons for such changes?

Lesson No. 2

1.The theme: Blood and lymph 2.

2. Purpose:

Learn:

- To give a morphofunctional characterization of blood as tissue.
- Distinguish in the preparation of a blood smear stained with azur II and eosin, erythrocytes, platelets
- Cytofunctional features of erythrocytes and blood plates.

3. Learning objectives: Knowledge of blood morphology is necessary for a doctor of any profile. Blood is a tissue that reacts quickly to deviations in the physiological state of the body. Studies of the quantitative composition of shaped blood elements and their tinctorial signs are widely used in clinical practice.

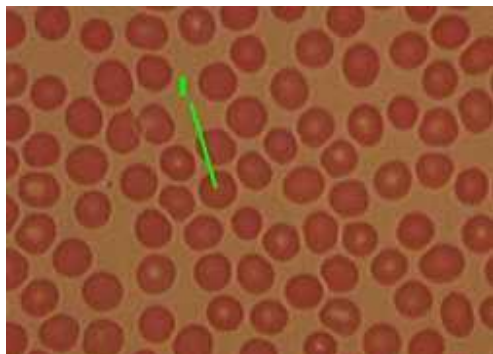
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2. Characteristics of blood as tissue.
3. Morphology and function of shaped blood elements.
4. An idea of the hemogram and leukocyte formula, their age and sexual characteristics.
5. The composition of the lymph.

Handout material.

1. Microscopes
 2. Micro-preparations for the study
- A smear of human blood. Romanovsky coloring.

Smear of human blood. Painted by the Romanovsky-Gimza method.



Smear of human blood.

Painted by the Romanovsky-Gimza method.

Erythrocyte-the cell is colored pink due to the high content of alkaline protein (hv) (eosinophilia) the weak staining of the central part of the cell depends on the shape of the erythrocyte.



Neutrophils in a smear of human blood.

Painted by the Romanovsky-Gimza method.

Neutrophils (1) - consist of 3-5 segmented nuclei.

The core is densely basophilic colored.

Small azurophilic granules-reddish – blue, and special granules-yellow-pink painted.



Basophils in human blood smears.

Painted by the Romanovsky-Gimza method.

Basophils (1). It has a basophilic dense nucleus, consisting of -3 parts, similar to the letter S. Metachromatically colored (from Pink-bluish to black) with granules of different sizes.

The core is often combined with granules.



Eosinophils in a smear of human blood.

Painted by the Romanovsky-Gimza method.

Eosinophils (1) - the nucleus is not very dense, consisting of 2 parts. The cell is of an irregular shape, it contains many orange – yellow oxyphilic granules.



Lymphocyte in a smear of human blood.

Painted by the Romanovsky-Gimza method.

Lymphocyte (1) - not very large.

the nucleus occupies most of the cell volume.

and the basophilic cytoplasm is surrounded by a thin ring-shaped nucleus.


The nucleus of large lymphocytes is not very dense, reddish – brown in color, the cytoplasm is weakly basophilic, has a large volume.

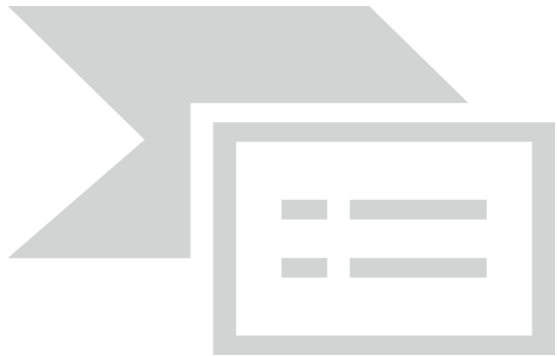


Monocyte in a smear of human blood.

Painted by the Romanovsky-Gimza method.

A monocyte (1) is a large cell, twice the size of the surrounding red blood cells. The core is Bob-shaped.

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	<p>Platelet in a smear of human blood.</p> <p>Painted by the Romanovsky-Gimza method.</p> <p>Platelet (1) - weakly expressed in shape, forming a small number of groups, next to it is a rod-nucleated neutrophil (2).</p> <p>The cytoplasm is grainy (granulomer), basophilic, the periphery of the cytoplasm is weakly colored.</p>
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Functions-transport, hemostasis, defense, hemocoagulation.

5. The main forms/ methods/ technologies of training to achieve the LO discipline: working in small groups, filling out a checklist of histological preparations and microphotographs.

6. Types of control to assess the level of achievement of the LO discipline: the checklist for evaluating the practical lesson.

7. Literature.

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8. Control

Questions

1. What is a Hemogram, what does it look like in humans under normal conditions.
2. leukocyte formula in humans under normal conditions.
3. morphological and chemical characteristics of granulocytes and their functional significance.
4. What are Agronulocytes, their morphologic and functional significance.
5. morphological and chemical characteristics of erythrocytes and blood plasters.

Test questions

1. a blood smear revealed cells with a curved s – shaped nucleus, metachromically colored granules in the cytoplasm, which make up 0.5% of the total number of leukocytes. These features are characteristic of horses.

- A) to neutrophils
- B) to basophiles
- C) eosinophils
- D) monocytes
- E) to lymphocytes

2. in a histochemical study of a blood smear, cells containing granules containing histamine and heparin were observed in the cytoplasm. These features are characteristic of horses.

- A) to neutrophils
- B) eosinophils
- C) basophiles
- D) monocytes
- E) red blood cells

In the preparation of the bony red marrow of 3 people, a cluster of giant cells located in contact with the sinusoid capillary was detected. It is from these cells that a poison appears later.

- A) red blood cells
- B) leukocytes
- C) monocytes
- D) platelets
- E) lymphocytes

A mixture of microorganisms was added to a test tube containing a set of 4 leukocytes. Manifestations of microbial phagocytosis ... observed in cytoplasm.

- A) lymphocytes and basophils
- B) lymphocytes and eosinophils
- C) neutrophils and monocytes
- D) monocytes and lymphocytes
- E) lymphocytes and neutrophils

In the study of 5 blood smears by the Romanovsky-Gimza method, cells with a weak basophilic cytoplasm and a kidney-shaped nucleus of a round shape were observed, 20% larger (diameters of 20 microns). This phenomenon is clinically relevant ... typical.

- A) to lymphocytosis
- B) leukopenia
- C) to monocytosis
- D) neutrophilosis
- E) reticulocytosis

6 in the blood of a patient suffering from a parasitic disease (glistening infestation) usually ... there is an increase in the number.


- A) lymphocytes
- B) monocytes
- C) basophiles
- D) eosinophils
- E) red blood cells

7 lymphocytes with cytotoxic function include poisons.

- A) B - lymphocytes
- B) T-suppressors
- C) T-helpers
- D) T-memory cells
- E) the T-killers

8 main functions of the Basophil:

- A) the release of collagen
- B) the production of antibodies.

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C) breakdown of histamine.

D) release of histamine and heparin.

E) phagocytosis of microbes.

9 main functions of neutrophils:

A) phagocytosis.

B) synthesis of collagen.

C) antibody production.

D) oxygen transport.

E) histamine synthesis.

10 .leukocytosis refers to leukocytes in the blood...

A) change in relationship

B) reduction

C) violation in the multidimensional

D) reproduction

E) the appearance of completely imperfect forms

8.Control

Reports

1.when calculating the leukocytic formula in the blood of an adult, leukocytes with a sharply arched basophilic nucleus were found around a narrow circle of light blue cytoplasm. Their relative number was 40%. What are these uniform elements? Does the norm correspond to their number?


2.when calculating the leukocytic formula in the blood of adults, cells were found in the cytoplasm of 5% of leukocytes with a bean-shaped nucleus and fragile oxphilic granules. The nucleus, similar to white blood cells, but rod - shaped, was 10%, and the segmented nucleus-45%. What are these leukocytes? Does the norm correspond to their number? What is the name of this ratio of cells in the clinic?

3.when calculating the Leukocytic formula, 60% of lymphocytes and 30% of neutrophil granulocytes were found in the child's blood. How do you rate this result? Comment on the answer.

4.the blood of the inhabitants of mountainous and flat lands is studied. What differences are expected in the hemogram? Explain the reasons.

5.the blood test revealed 63% neutrophils, 9% eosinophils, 22% lymphocytes and 6% monocytes. Does the norm correspond to the leukocytic formula? If not, what are the possible reasons for its change?

6.erythrocytes of $2.5 \times 10^{12} / L$ and 12% reticulocytes were found in the patient's blood. What term describes the appearance of blood in the clinic? What are the possible reasons for such changes?

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Lesson number 3

1. Topic: Embryonic hematopoiesis

2. purpose:

Teach:

- * Description of the features of embryonic blood production.
- * Identification and differentiation of erythroid cells and white blood cells in red bone marrow infection.
- * Analysis of the unitary theory of blood production.
- * Description of the features of postembryonic blood formation.
- * Explain the Basic Laws of ultrastructural and histochemical changes in the differentiation of blood cells.

3. Training tasks:

Blood, lymph and the organs that make them, as well as the cells of the blood that are displaced to the connective and epithelial tissues, make up the blood system. This system is involved in maintaining the stability and genetic integrity of the internal environment of the body. Any pathological conditions express their symptoms in this blood system, which is of great importance in medicine for diagnosing diseases.


4. main questions of the topic:

1 Write down the main stages of embryonic blood production in a notebook with a table.

Stages of embryonic blood formation	organs	timing	blood formation cells
Mesoblastic			
Hepatotimolienal			
Thymomedulolymphoid			

2. mark the organs of development of the shaped elements of the blood for the embryonic period.

Monocytes Blood plates blood-shaped elements	Органдар					
	Сары уыз қапшығы	бауыр	Көкбауыр	Лимфа түйіні	Тимус	Қызыл сүйек кемігі
Erythrocytes						
Granular leukocytes						
Lymphocytes:						

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B					
T					
Monocytes					
Bloodplates					

3.where the shaped elements in human blood develop in the postembryonic period. Fill in the table of postembryonic myelopoiesis and lymphopoiesis

Organs	Formation of shaped elements
Redbonemarrow	
Foramenovale	
Lymphaticnodes	
Spleen	
Tonsil	
Appendix	
Solitaryknots	

4. Study the scheme of postembryonic hematopoiesis by tracing each of the differons (rows of developing shaped blood elements). Write down and remember the names of the classes of hematopoietic cells.

5. Identify and record the main factors regulating stem cell differentiation.

Handout material

1 Microscopes

2 Micro-preparations for studying and sketching

A smear of red bone marrow. Staining with azur II-eosin. Workshop page 169. back. №4.


5. The main forms/ methods/ technologies of training to achieve the LO discipline: working in small groups, filling out a checklist of histological preparations and microphotographs.

6. Types of control to assess the level of achievement of the LO discipline: the checklist for evaluating the practical lesson.

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Перевод Учебник по гистологии человека

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- ATLAS OF HISTOLOGY with Functional Correlations. Thirteenth Edition, Wolters Kluwer.2017.- 1102 p.
- Theory and practice of Histological techniques.Eighth edition.Elsevier Limited.2019.- 554 p.
- Textbook of HumanHistology.With Color Atlas and Practical Guide/8 thEdition.Jaypee Brothers Medical Publishers .2011.-386 p.
- USMLE Step 1.Lecture Notes 2018.by Kaplan.2018.-425 p/
- Zhumabayeva, S.E., Boken, T.S.Cytology and histology : Educational-methodical complex. . - Kokshetau: KGU, 2017. - 101 p.<http://rmebrk.kz/>
- Бородулина, О.В.Цитология и гистология – Cytology and histology : Практикум. / Костанайский гос. педагогический университет им. У. Султангазина. - Костанай: КГПУ им.У.Султангазина, 2020. - 100 с. - <http://rmebrk.kz/>

8. Control

Questions

- where does the first hemocytopoiesis begin in embryogenesis? What blood cells are formed?
- in which organs does hemocytopoiesis occur in the embryonic period and what stages do they separate?
- How is embryonic hemocytopoiesis different from postembryonic hematopoiesis?
- in what organs does hemocytopoiesis occur in the Postembryonal period?
- What morphological changes occur in cells in postembryonic erythropoiesis and what are the intermediate stages called?
- name the stages of development of granulocytes and indicate changes in the nucleus and cytoplasm?
- at what stages do platelet formations take place in adults?
- How And Where are monocytes formed?
- name the non-blood cells of the red bone marrow?
- what hematopoietic cells are capable of dividing in the red bone marrow?

Test questions


1.it was found that the newborn's thymus is not fully developed. This condition leads to a violation of the meat process in the child.

- monocytopoiesis
- neurophilopoiesis
- erythropoiesis
- lymphopoiesis
- megakaryocytopoiesis

The 2.46-year-old patient was found to have impaired granulocytopoiesis and thrombocytopoiesis. The listed pathological process indicates that it is related to meat.

- to the thymus

- B) to the spleen
C) to the lymph nodes
D) to the liver
E) to the red bone marrow
3. when examining the tissue of the myeloid taken from the bone of a 6-year-old child, it was found that the nuclei of developing cells are in the phase of pycnosis and external outflow. This indicates that hematopoiesis belongs to the type of meat.
- A) monocytopenia
B) lymphopenia
C) neutrophilopenia
D) erythropenia
E) megakaryocytopenia
4. an electronic microphotograph shows a cell belonging to the macrophage family, along the shoots of which there are erythrocytes of various stages of maturation. Such a view ... meet.
- A) in thymus
B) in the lymph node
C) in the red marrow of the bone
D) in the spleen
E) on the tonsils
5. after Tetherotransplantation, the rejection of the organ transplant is determined. This process ... the cells provide.
- A) T-lymphocyte-killer
B) T – lymphocyte-helper
C) T – lymphocyte-suppressor
D) Lymphocyte-O
E) T – lymphocyte - memory
6. it is known that human peripheral circulating blood can contain megalocytes. Under normal conditions, these cells are in the blood ... occurs in the period.
- A) under 1 year of age
B) embryonic
C) age from 1 to 30 years
D) old age
E) pregnancy
7. the process of creating blood in the red bone marrow of embryogenesis... starts
- A) in 5 months
B) in Week 7-8
C) in Week 9 -10
D) in 2 -3 weeks
E) in Week 12
- Red bone marrow in 8 adults ... it won't.
- A) the tube is in the pineal gland of the bones
B) in the clavicles
C) in the pelvic bones
D) the tube is in the diaphyses of the bones
E) breast
9. the process of embryogenesis of blood formation in the wall of the yolk sac... goes.
- A) in 2-3 weeks
B) in 4-5 weeks
C) at 7-8 weeks
D) at the end of the 1st month
E) in the 2nd month
10. the process of embryogenesis of blood production in the fork gland... the week begins.

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- A) 7–8
- B) 4-5
- C) 2-3
- D) 12
- E) 10

11. red bone marrow skeleton (stroma)... forms tissue.

- A) napkin
- B) reticular
- C) reticle-epithelial
- D) Bone
- E) tight Solder

12 .skeleton (stroma) of the fork gland... forms tissue.

- A) reticular
- B) napkin
- C) reticle-epithelial
- D) loose Solder
- E) tight Solder

Situational tasks

1. megakaryocytes are found in the blood-forming organs of adults. What kind of blood-making organ is this? What functions do megakaryocytes perform?
2. in the red bone marrow, developing blood cells are arranged in the form of islands. The first islets are associated with macrophages, the second has no macrophages. What blood cells develop on the first and second islet? What function do macrophages perform on the island?
3. due to acute blood loss, the patient's blood test showed low hemoglobin levels, the number of reticulocytes increased, and the leukocytic formula shifted to the left. What is the low hemoglobin indicator associated with?
4. the fork gland of experimental mice was removed the moment after birth. How is this condition observed in immune responses? What form (form) elements of the blood are these disorders associated with?
5. by the centrifuge method, the form elements of the blood were separated from the plasma and placed in the feeding medium. Which elements can give colonies?
6. it is known that under the influence of radiation radiation, more than anything else, the functions of the bony red marrow, gastrointestinal tract and sex glands suffer. The reason for the sensitivity of these organisms to radiation is what morphological features they have.

The lesson 4.

1. Topic 4: Blood production and immunogenesis organisms.

2..Purpose: To know the microscopic and ultramicroscopic structure of the organs of hematopoiesis and immunogenesis.

3. Learning objectives:

- Learn to identify the structural elements of hematopoiesis organs under a microscope
- Learn to identify peripheral hematopoiesis organs under a microscope
- Be able to explain the role of hematopoiesis organs in the formation of humoral and

- cellular immunity

4. The main issues of the topic:

Complete the tasks.

3. complete the table, remembering the basic functions of immunocompetent cells

Immunocompetent cells	development	functions
T-lymphocyte		
B-lymphocyte		
The T-killers		
T-helpers		
T-suppressors		
Plasmocytes		
Macrophages		

1.4. Take a picture of what processes take place in the main functional areas of the lymph nodes and fill out the table.


Functional features of lymph nodes	processes
regions	
Lymphedema	
Paracortical region	
Milksozbas	

2. 5. Follow the path of the lymph in the lymph nodes.

3. 6. Fill out the table, indicating that the same processes are performed in the main functional areas of the spleen.

The function of the spleen	processes
regions	
White tissue nymphalymphal	
Periarterialregion	

Red tissue tissue	
Sinuses	
Marginalregion	

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4. write down the characteristics of the intestinal structure with the tonsils.
5. 8.find out in what ways antigens enter the peripheral lymphoid organs and complete the tablefill.

Members	Color lines of antigens
Lymph node	
Spleen	
Tonsils	
Blind intestine	

Handoutmaterial

Microscopes

Micro-preparations for studying and sketching

1. Thymus. Staining with hematoxylin-eosin.
2. The lymph node. Staining with hematoxylin-eosin.

5. The main forms/ methods/ technologies of training to achieve the LO discipline: working in small groups, filling out a checklist of histological preparations and microphotographs.

6. Types of control to assess the level of achievement of the LO discipline: the checklist for evaluating the practical lesson.

7. Literature.

Main literature


1. Inderbir Singh. Textbook of Human Histology. With Color Atlas and Practical Guide/8th Edition. Jaypee Brothers Medical Publishers .2016.-302 p. Перевод Гистология человека
2. Dudek Ronald W. Embryology / Ronald W. Dudek. - 5th ed. - [s. l.] : Wolters Kluwer, 2014. - 158 p. Перевод заглавия: Эмбриология
3. Gartner Leslie P. Cell Biology and Histology / Leslie P. Gartner. - 8th ed. - [s. l.] : Wolters Kluwer, 2019. - 436 p. - (BRS. Board Review Series) Перевод заглавия: Клеточная биология и гистология

Additional literature

Textbook of Human Histology. Inderbir Singh / Sixth Edition / Inderbir Singh 2010.-386 p.
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Brothers Medical Publishers .2011.-386 p.

4. USMLE Step 1.Lecture Notes 2018. by Kaplan.2018.-425 p/
5. Zhumabayeva, S.E., Boken, T.S.Cytology and histology : Educational-methodical complex. . - Kokshetau: KGU, 2017. - 101 p.<http://rmebrk.kz/>
6. Бородулина, О.В.Цитология и гистология – Cytology and histology : Практикум. / Костанайский гос. педагогический университет им. У. Султангазина. - Костанай: КГПУ им.У.Султангазина, 2020. - 100 с. - <http://rmebrk.kz/>

8. Control

1. Morphofunctional characteristics of hematopoiesis organs
2. Classification, sources and course of development.
3. Red bone marrow
4. Thymus
5. Lymph nodes
6. The spleen
7. Muco-lymphoid formations

Tests

1. The stroma of the red bone marrow is
 - A) Loose connective tissue
 - B) Dense connective tissue
 - C) Reticular tissue
 - D) Adipose tissue
 - E) Bone tissue
2. The stroma of the thymus is:
 - A) Loose connective tissue
 - B) Dense connective tissue
 - C) Reticuloepithelium
 - D) Adipose tissue
 - E) Dense connective tissue
3. Lymphatic follicles containing the central artery:
 - A) Thymus
 - B) The spleen
 - C) The amygdala
 - D) Lymph nodes

E) Appendix

4. Hematopoietic organ containing red and white pulp:

A) Red bone marrow

B) Lymph nodes

C) Tonsils

D) The spleen

E) Thymus

5. The destruction of red blood cells occurs in:

A) thymus

B) lymph nodes

C) the spleen

D) tonsils

E) red bone marrow

6. Cellular composition of the paracortical zone of the lymph node

A) B-lymphocytes, lymphoblasts, dendritic macrophages

B) Red blood cells, platelets

C) T-lymphocytes, lymphoblasts, interdigitating macrophages

D) Granulocytes, macrophages, tissue basophils

E) Erythroblasts, myeloblasts, monoblasts

7. Cellular composition in the reactive centers of lymph node follicles

A) Erythroblasts, myeloblasts, monoblasts

B) Erythroblasts, platelets

C) B-lymphocytes, lymphoblasts, dendritic macrophages

D) T-lymphocytes, lymphoblasts, interdigitating macrophages

E) Granulocytes, macrophages, tissue basophils

8. Cells forming the cerebral strands of the lymph node

A) Granulocytes, macrophages, tissue basophils

B) B-lymphocytes, macrophages, plasmocytes

C) T-lymphocytes, macrophages


D) Erythrocytes, platelets

E) Erythroblasts, myeloblasts, monoblasts

9. The white pulp of the spleen forms

A) Lymphatic follicles

B) Reticulocytes and erythrocytes

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C) Capsule with trabeculae

D) The paracortical zone

E) Cerebral cords and sinuses

10. The red pulp of the spleen forms

A) Lymphatic follicles

B) Cerebral cords and sinuses

C) The paracortical zone

D) Capsule and trabeculae

E) Reticular tissue with erythrocytes and other blood cells

Tasks

1. It is known that with radiation damage, the functions of the red bone marrow, gastrointestinal tract and gonads suffer the most. What morphological features bring these organs closer together in terms of sensitivity to radiation?
2. It has been established that developing blood cells are located in islands in the red bone marrow. Some islets (1) are associated with macrophages, others (2) do not have macrophages. Which cells develop in the first and second islets? What role do macrophages play in islets (1)?
3. If the thymus is removed from a newborn animal, and then a foreign transplant is transplanted (for example, a kidney from another animal), then the rejection reaction of the transplanted organ does not develop. What is the reason for this phenomenon?
4. Infectious inflammation causes protective reactions in regional lymph nodes, including an increase in the number of plasmocytes in the cerebral cords and sinuses. How do the number of plasmocytes increase? What role do they play?
5. The researcher revealed an increased iron content in histological preparations. What is the source of iron in the spleen? What is the evidence of an increase in its content?
6. The researcher found that the mesenteric lymph nodes of animals during active digestion are larger than those of hungry ones. How can this fact be explained? In which areas of the lymph nodes will there be differences?