

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ**  
**Харківський національний медичний університет**

**DISEASES OF HEMATOPOIETIC SYSTEM.  
ATHEROSCLEROSIS.  
ISCHEMIC HEART DISEASE. HYPERTENSION.  
SYSTEMIC DISEASES OF CONNECTIVE TISSUE  
WITH IMMUNE DISTURBANCES**

*Manual for practical classes in pathomorphology  
for English-speaking medical students*

**ХВОРОБИ СИСТЕМИ КРОВІ. АТЕРОСКЛЕРОЗ  
ТА ІШЕМІЧНА ХВОРОБА СЕРЦЯ.  
ГІПЕРТОНІЧНА ХВОРОБА.  
РЕВМАТИЧНІ ХВОРОБИ**

*Методичні вказівки до занять з патоморфології  
для студентів медичних вузів  
з англійською мовою навчання*

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## Foreword

Pathomorphology, one of the most important medical subjects is aimed at teaching students understanding material basis and mechanisms of the development of main pathological processes and diseases.

This manual published as separate booklets is devoted to general pathological processes as well as separate nosological forms. It is intended to the English-medium students of the medical and dentistry faculties. It can be used as additional material used both for home and individual work in class. It can also be used to master the relevant terminology and its unified teaching.

The manual is based on the syllabuses in Pathomorphology for Medical Students (2015).

For a practical class of 2 hour duration the following time calculation is recommended:

1. Determining the primary level of the knowledge – 5 min.
2. Independent work of the students – 50 min.
3. Determining the final level of the knowledge – 20 min.
4. Checking the protocols of the practical class and attestation of the students – 15 min.

The suggested Manual allows to organize the teaching process in the proper way.

## References:

1. Патоморфологія : нац. підручник / В.Д. Марковський, В.О. Туманський, І.В. Сорокіна та ін. ; за ред. В.Д. Марковського, В.О. Туманського. – Київ : ВСВ «Медицина», 2015. – 936 с.
2. Струков А.И. Патологическая анатомия / А.И. Струков, В.В. Серов. – Москва : Медицина, 1993. – 687 с.
3. Anderson's Pathology // Edited by John M. Kissane. The C.V. Mosby Company. – Toronto – Philadelphia, 1990. – 2196 p.
4. Thomas C. Macropathology / C. Thomas. – Toronto – Philadelphia : B.C. Decker Inc., 1990. – 355 p.
5. Thomas C. Histopathology / C. Thomas. – Toronto – Philadelphia : C. Decker Inc., 1989. – 386 p.

## Lesson

### Subject "Diseases of Hematopoietic System"

**Validation of the subject:** The knowledge of pathology of hematopoietic organs is essential for successful understanding of the tumors of hematopoietic and lymphatic tissue and anaemia, studying clinical subjects and for clinical-anatomic analysis.

**Objectives of the lesson:** to study the etiology, pathogenesis, classification, morphological characteristics, complications, causes of death pathomorphosis of hemoblastoses and anaemia and to be able to differentiate them according to the morphologic features.

## Visual aids

### *Annotated tables:*

- diagram of hematopoiesis;
- classification of hemoblastoses;
- classification of anaemia .

### *Colour pictures:*

- pathological anatomy of acute, chronic leukemia and Hodgkin's disease.

### *Slides:*

- liver in chronic myelocytic leukemia;
- liver in chronic lymphocytic leukemia;
- lymph node in Hodgkin's disease.

### *Macrospecimens:*

- organ complex in acute leukemia;
- necrotic quinsy;
- bone marrow of the tubular bone in acute leukemia;
- bone marrow of the femur in chronic lymphocytic leukemia;
- packages of the lymph nodes in chronic lymphocytic leukemia;
- spleen in chronic myelocytic leukemia;
- bifurcation and mesenteric lymph nodes in Hodgkin's disease;
- spleen in Hodgkin's disease;
- bone marrow of the tubular bone in chronic posthemorrhagic anaemia.

### *Microspecimens:*

- # 219 – liver in chronic myelocytic leukemia;
- # 221 – liver in chronic lymphocytic leukemia;
- # 134 – Hodgkin's disease.

### *Electronogram:*

- myeloma cell.

## Questions to control basic knowledge:

1. Is leukemia a tumor?
  2. Indicate which of the following attributes are based on division of leukemia into acute and chronic:
    - A. *Change in the amount of leukocytes in peripheral blood.*
    - B. *Degree of differentiation of tumor cells.*
    - C. *Growth rate of cells.*
    - D. *Blast crisis.*
    - E. *Occurrence of the tumor cells in peripheral blood.*
    - F. *Duration of the course.*
  3. What is the name of leukemia in which the peripheral blood is not changed:
    - A. *Leukemic.*
    - B. *Subleukemic.*
    - C. *Leukopenic.*
    - D. *Aleukemic.*
  4. Which forms of leukemia are: 1) acute, 2) chronic?
    - A. *Myelocytic.*
    - B. *Lymphoblastic.*
    - C. *Myeloblastic.*
    - D. *Lymphocytic.*
- Answers:* 1 – yes; 2 – b; 3 – d; 4 (1 – d, 1 – c), 4 (2 – a, 2 – d).

## Stages of individual work in class

### Study and describe macrospecimens:

1. *Organ complex in acute leukemia*: Pay attention to microfocal haemorrhage on the skin. Describe the ulcerative defects in the oesophagus mucosa, haemorrhage in the brain, the packages of the lymph nodes. Explain haemorrhagic diathesis in acute leukemia?

2. *Necrotic quinsy*: The appearance of the tonsils, their size and colour. What are the causes of development of necrotic changes on the gastrointestinal tract in acute leukemia?

3. *Bone marrow of the tubular bone in acute leukemia*: Pay attention to the replacement of the yellow bone marrow by red one. What is the pathogenesis?

4. *Bone marrow of the femur in chronic lymphocytic leukemia*: Pay attention to yellow-green colour of the marrow. How can "pyoid" marrow be explained?

5. *The packages of the lymph nodes in chronic lymphocytic leukemia*: Describe the size of the lymph nodes, their appearance on section. Explain the enlargement of the lymph nodes.

6. *Spleen in chronic myelocytic leukemia*: the size, colour, condition of the capsule; availability of cicatrices from previous infarctions in it. The cause of the spleen enlargement.

7. *Bifurcate and mesenteric lymph nodes in Hodgkin's disease*: Pay attention to the size of the lymph nodes, their colour and condition of the tissue on section. Name the stages of Hodgkin's disease.

8. *Spleen in Hodgkin's disease*: Describe the size and colour of the organ on section. How is spleen in Hodgkin's disease called?

9. *Bone marrow of the tubular bone in chronic posthemorrhagic anaemia*: Pay attention to the replacement of the yellow bone marrow with red bone marrow. What is it connected with. What does the appearance of such marrow remind?

### Study, draw and describe the microspecimens

– # 219 – *liver in chronic myelocytic leukemia* (stained with hematoxylin and eosin). At low magnification find diffuse growth of leukemia cells in the liver lobule and portal tract. At large magnification study infiltrate cells, determine the type of hepatocyte degeneration. What are hemo- and myelograms in the patients with chronic myelocytic leukemia?

– # 221 – *liver in chronic lymphocytic leukemia* (stained with hematoxylin and eosin). Determine the localization of leukemia infiltrates along the portal tract. At large magnification study leukemia infiltrate, establish the type of hepatocyte degeneration. What are hemo- and myelograms in the patients with chronic lymphocytic leukemia characterized by?

– # 134 – *lymph node in Hodgkin's disease* (stained with hematoxylin and eosin). Under low magnification pay attention to the erased picture of the lymph node, at large magnification study infiltrate cells, find Reed-Sternberg cells. Name histological variants of Hodgkin's disease.

**Study the electronogram:**

*Myeloma cell.* Pay attention to expansion of endoplasmatic reticulum canals filled with paraprotein. What group of leukemia does multiple myeloma belong to? Name the types of multiple myeloma according to its localisation. Name histological variants of multiple myeloma.

**Krok questions:**

1. A tumour was found in the locus of a pathological fracture of a rib in a male patient. The case history contained information about persistent proteinuria with presence of abnormal proteins of Bence-Jones type, as well as presence of osteolytic foci in the bones of the spine, skull and pelvis. Histologically, the tumour cells were represented by plasmablasts and plasmacytes. What is your diagnosis?

- A. *Primary macroglobulinaemia.*
- B. *Heavy-chain disease.*
- C. *Osteosarcoma.*
- D. *Multiple myeloma.\**
- E. *Fibrosarcoma.*

2. Thoracotomy in a 55-year-old male patient revealed a packet of lymph nodes in the anterior mediastinum; a biopsy was taken from one of them. Microscopically, there were infiltrates consisting of lymphocytes, histiocytes, eosinophils and Reed-Sternberg multinuclear cells which were surrounded by vegetations of a fibrous connective tissue. Name the clinical-morphological form of lymphogranulomatosis.

- A. *Lymphogranulomatosis with suppression of the lymphoid tissue.*
- B. *Mixed-cell variant of lymphogranulomatosis.*
- C. *Lymphogranulomatosis, nodular sclerosis.\**
- D. *Lymphogranulomatosis with prevalence of the lymphoid tissue.*

3. In a 45-year-old patient the ulcerative-necrotic damage of the mucosa of the oral cavity takes place; also the spread lymphadenopathy, slight spleno- and hepatomegaly, diffuse hemorrhages in the skin and mucous membranes were found out. In blood analysis the increasing of leukocytes (to 100 10 per 1 ml) at the account of lymphoblasts takes place. What diagnosis is more probable?

- A. *Acute lymphoblastic leukemia.\**
- B. *Chronic myelocytic leukemia.*
- C. *Chronic lymphocytic leukemia.*
- D. *Plasmocytosis.*
- E. *Acute promyelocytic leukemia.*

### **Questions to control the knowledge:**

1. Give definition of hemoblastoses.
2. Give definition of leukemia, what is the difference between leukemia and leukocytosis.
3. What factors allow to define leukemia as acute or chronic?
4. Name histo- (cyto-) genetic classification of acute and chronic leukemia; the difference between them.
5. What is the difference in hemo- and myelogram in acute and chronic leukemia?
6. Pathological anatomy of acute and chronic leukemia.
7. Complications and causes of death in leukemia.
8. Pathomorphosis of leukemia.
9. The signs of leukemia in children.
10. Classification of lymphoma. Hodgkin's disease.
11. Anaemia, its types.
12. Pathological anatomy of anaemia.

### **Terminology**

Leukemia, hemoblastoses, lymphoma, leukemic failure, blast crisis, Gunter's glossitis, pyoid marrow, Hodgkin's disease.

### **Practical habits and skills**

The students are to be able to give histogenetic diagnosis of leukemia, tumours of lymphatic tissue and anaemia; to be able to differentiate them on the basis of study of morphology of diseases of hematopoietic system.

### **Revise the word-building elements:**

- hemo – blood
- hemato – blood
- blasto – immature cell
- leuko – white blood cell
- lympho – lymph, lymphatic system
- cyto – cell
- myelo – bone marrow
- pyo – pus
- odonto – tooth
- histo – tissue
- patho – disease
- morpho – shape
- gram – record
- genesis – development
- lysis – destruction
- poiesis – formation
- emia – blood condition
- blast – immature cell

- osis – disease
- oma – tumor
- oid – resembling
- rrhagia – bursting forth blood
- a – absence
- an – absence
- micro – small
- macro – large
- post – after

### Lesson

#### **Subject: "Atherosclerosis, Ischemic Heart Disease (IHD)"**

**Validation of the subject:** The knowledge of the present subject is essential for learning heart and vascular diseases, hypertension, diabetes mellitus both at theoretical and clinical departments, for clinicoanatomical analysis of autopsy material in the practical work.

**Objectives of the lesson:** To learn how to detect etiological factors, pathogenesis, to study morphology and morphogenesis of atherosclerosis, its main clinico-morphologic forms, periods and complications.

#### **Visual aids:**

*Annotated tables:*

- the etiology and pathogenesis of atherosclerosis;
- different types of atherosclerosis and its morphogenesis;
- clinico-morphological forms of atherosclerosis;
- ischemic heart disease: its causes, forms, outcomes;
- myocardial infarction;
- chronic IHD – forms, outcome.

*Coloured tables:*

- atherosclerosis of cerebral, coronary vessels, those of the kidney and intestine;
- myocardial infarction;
- white brain infarct;
- gangrene of the intestine;
- gangrene of the foot.

*Slides:*

- atherosclerosis of the aorta;
- atherosclerosis of the coronary artery;
- myocardial infarction.

*Macrospecimens:*

- atherosclerosis of the aorta;
- atherosclerotic aortic aneurysm with thrombus;
- dissecting aortic aneurysm;
- atherocalcinosis of the aortic arch;

- atherosclerosis of the arteries of the brain base;
- stenosing, atherosclerosis of the coronary artery with thrombosis, acute myocardial infarction, complicated by development of acute mural aneurysm with its rupture;
- chronic aneurysm of the heart with parietal thrombus;
- gangrene of the foot.

*Microspecimens*

- # 186 – aortic lipoidosis;
- # 185 – atherosclerosis of the coronary artery;
- # 184 – necrotic stage of myocardial infarction.

*Electronograms:*

- myocardial infarction;
- stage of ischemia.

**Questions to control basic knowledge:**

1. Is atherosclerosis a frequent disease in the population of Africa and Asia?
  2. Indicate the main etiologic factors of atherosclerosis:
 

A. Hypoxia.	C. Stress.	F. Hormonal factors.
B. Abnormal fat metabolism.	D. Arterial hypotension.	G. Arterial hypertension.
	E. Hereditary factors.	H. Infectious diseases.
  3. Name the stages of atherosclerosis pathogenesis:
 

A. Hyalinosis.	D. Lipoidoses.	G. Thrombosis.
B. Atheromatosis.	E. Pre-lipid stage.	
C. Plasmorrhagia.	F. Atherocalcinosis.	
  4. On the basis of which diseases does ischemic heart disease develop:
 

A. Rheumatism.	D. Pneumonia.
B. Anemia.	E. Hypertensive disease.
C. Atherosclerosis.	F. Diabetes mellitus.
  5. Morphological manifestations of chronic IHD are:
 

A. Postinfarction cardiosclerosis.	C. Microfocal cardiosclerosis.
B. Myocarditis.	D. Repeated myocardial infarction.
- Answers: 1) no; 2) b, c, f, g; 3) b, d, e, f; 4) c, e, f; 5) a, c.

**Stages of individual work in class**

**Study and describe the macrospecimens:**

1. *Artherosclerosis of the aorta.* Pay attention to the thickness relief, colour of the aortic intima, the condition of the lumen, the elasticity of the vascular wall. Name visual manifestations of atherosclerosis.

2. *Atherosclerotic aortic aneurysm with thrombus.* Pay attention to the form of aneurysm, the condition of the intima of the adjacent parts. Name the causes of thrombogenesis and possible complications in this case.

3. *Dissecting aortic aneurysm.* What is the danger of this pathology? Name the mechanism of complications.

4. *Atherocalcinosis of the aortic arch.* How can we diagnose this pathology intravitaly (during the patient's life)? Name the possible clinical signs.

5. *Atherosclerosis of the arteries of the brain base.* Pay attention to the thickness of the walls, condition of the lumen, winding pathways of vessels. What is the cause? Name the main clinical manifestations of these changes.

6. *Stenosing atherosclerosis of the coronary artery with thrombosis, acute myocardial infarction complicated by development of acute mural aneurysm and its rupture.* Pay attention to the condition of the myocardium in the infarction zone. What is the name of this disease and its lethal complications.

7. *Chronic aneurysm of the heart with parietal thrombus.* How can we call the basic disease? What are the causes and role of thrombogenesis in this case.

8. *Gangrene of the foot.* Pay attention to the color of the soft tissues. What is the cause of the gangrene and what is the cause of darkness of the soft tissues?

#### **Study, draw and describe the microspecimens:**

– # 186 – *aortic lipoidosis* (stained with Sudan III). Pay attention to the infiltration of the intima with lipids. Find the accumulation of xantomatous cells.

– # 185 – *atherosclerosis of the coronary artery* (stained according to Van-Gieson). Using low magnification find the plaque with lipo-protein detritus, covered with connective tissue in the center. Evaluate the state of the lumen. How is it connected with the clinical state of the patient?

– # 184 – *necrotic stage of myocardial infarction* (stained with hematoxylin and eosin). Pay attention to the structureless part nuclearless muscular fibers with rough basophilia of the stroma and massive leukocytic infiltration. Name possible outcomes of these changes in the heart.

*Study the electronogram:*

Myocardial infarction, stage of ischemia. Pay attention to the rough swelling and vacuolisation of mitochondria with destruction of the crusts.

#### **Krok questions:**

1. On autopsy of a 68-year-old male, who died from cardiac decompensation, the myocardium of the anterior wall in left ventricle of his heart contained an irregular grey focus, 5 x 4 cm in size, with a dense consistency, fibrous structure and clear borders. What pathological process in the myocardium did the pathologist reveal?

A. *Myocarditis.*

B. *Microfocal cardiosclerosis.*

C. *Infarction.*

D. *Postinfarction cardiosclerosis.\**

E. *Rheumatism.*

2. An autopsy of a 38-year-old male, who died in a car accident, revealed in his aorta some yellow-grey spots and stripes which did not rise above the surface of the intima. Microscopically, the intima had an abundant deposition of pro-

teins, plasma, fibrin, GAG, cholesterol, low-density lipoproteins; the endothelium had foci of affection. Name the stage of morphogenesis of atherosclerosis.

A. *Pre lipid.*

D. *Atheromatosis.*

B. *Lipoidosis.\**

E. *Atherocalcinosis.*

C. *Liposclerosis.*

3. A 65-year-old patient, who suffered from arteriosclerosis, has been hospitalized in surgical department because he had purulent peritonitis. Thrombosis of mesenteric arteries was found during operation. What is the form of atherosclerosis takes place?

A. *Atherosclerosis of mesenteric arteries.\**

B. *Atherosclerosis of brain.*

C. *Atherosclerosis of kidney's arteries.*

D. *Atherosclerosis of coronary arteries.*

E. *Atherosclerosis of extremities.*

### **Questions to control the knowledge:**

1. Define the term "atherosclerosis".
2. Name the types of atherosclerosis.
3. Name the etiologic factors of atherosclerosis.
4. What are the theories of atherosclerosis pathogenesis.
5. What is the morphogenesis of atherosclerosis? Characterize its changes.
6. Name the clinical periods and stages of atherosclerosis.
7. Name the clinico-morphological forms of atherosclerosis, their complications and causes of death.
8. Define the term "ischemic heart disease", name its pathogenetic factors.
9. Characterize chronic ischemic heart disease.
10. Name the causes of myocardial infarction.
11. What are the morphology, stages and outcomes of myocardial infarction?

### **Terminology**

Atherosclerosis, arteriosclerosis, hyperlipidemia, percholesterolemia, atheromatosis, xanthomatous cells, liposclerosis, atherocalcinosis, atherosclerotic kidney (atherosclerotic cirrhosis of the kidney), ischemic heart disease, angina pectoris, cardiogenic shock, ventricular fibrillation, asystolia.

### **Practical habits and skills**

The students are to be able to define the stages, clinico-morphological forms, complications and outcomes of atherosclerosis using macro- and micro-specimen.

### **Revise the word-building elements:**

hyper – increased

hypo – decreased

a – absence

thrombo – blood clot

- lipo – fat
- teno – pressure
- hemo – blood
- ischo – hold back
- sclero – hardening
- athero – plague
- plasmo – pl asma
- osis – disease
- emia – blood condition
- ia – condition
- orrhagia – bursting forth

### **Lesson**

#### **Subject: "Hypertension"**

**Validation of the subject:** The knowledge of this subject is essential for learning heart and vascular diseases in the clinical departments, for clinico-anatomical analysis of sectional material in practical work.

**Objectives of the lesson:** To study etiology, pathogenesis, morphology of the clinico-morphologic forms of hypertension, their complications and outcomes.

#### **Visual aids**

*Annotated tables:*

- etiopathogenesis of hypertensive disease;
- stages of the hypertensive disease;
- clinicoanatomical forms of hypertensive disease;
- complications and causes of death.

*Coloured tables:*

- concentric and excentric myocardial hypertrophy;
- cor bovinum (the great hypertrophic heart);
- myocardial infarction;
- cerebral infarction;
- arteriosclerotic nephrosclerosis.

*Slides:*

- arteriolosclerotic nephrosclerosis;
- ischemic cerebral infarction.

*Macrospecimens:*

- cor bovinum;
- concentric and excentric myocardial hypertrophy of the ventricle;
- atherosclerosis of the aorta;
- atherosclerosis of the coronary vessels;



### **Study, draw and describe microspecimens:**

– # 192 – *arteriosclerotic nephrosclerosis* (stained with hematoxylin and eosin). Using low magnification pay attention to the width of arteriole walls with its homogenization and acute stenosis of the lumen. There is marked lymphohistiocitis infiltration.

– # 189 – *gray softening of the brain* (stained with hematoxylin and eosin). Pay attention to the defect of the brain tissue, which is filled with large cells, containing eosinophil granular cytoplasm and occasionally loaded with amorphic pigments. What is the cause of these changes and their outcome? How is the brown pigment called? What is the mechanism of its formation?

– # 144 – *myocardial hypertrophy* (stained with hematoxylin and eosin).

– # 197 – *cardiosclerosis* (stained according to Van-Gieson)

### **Study the electronogram:**

*Spasm of arteriole in hypertensive disease.* Pay attention to the sharp narrowing of the lumen.

### **Krok questions:**

1. Against a background of hypertensive crisis, a male patient with hypertensive disease developed acute renal insufficiency which caused his death. What morphological changes in the renal arteioles were the most probable?

A. *Stenosing atherosclerosis.*

D. *Hyalinosis.*

B. *Hyperelastosis.*

E. *Sclerosis.*

C. *Fibrinoid necrosis.\**

2. A 56-year-old male patient with elevated blood pressure (250/120 mm Hg) died from an impairment of his cerebral circulation. An autopsy of the brain revealed a red focus in the thalamus, 2.5 cm in diameter, which sank on section. Microscopically, there was fibrinoid necrosis of the vascular walls and impregnation of the necrotized brain tissue with blood. Which of the diagnoses listed below was the most probable?

A. *Cerebral haematoma.*

C. *Anaemic infarct of brain.*

B. *Haemorrhagic infarct of brain.\**

D. *Mixed infarct.*

3. The patient has suffered with hypertensive disease for a long period and died with signs of cardiac and vascular insufficiency. What macroscopical changes and in which parts of the heart can be found during autopsy?

A. *Hypertrophy of left ventricle.\**

D. *Sclerosis of mitral valve.*

B. *Hypertrophy of right ventricle.*

E. *Fibrinous pericarditis.*

C. *Brown atrophy of myocardium.*

### **Questions to control the knowledge:**

1. Define the term "Hypertensive disease".
2. Define the term "Symptomatic hypertension".
3. Name the types of symptomatic hypertension
4. What are stages and variants of the development of hypertensive disease?

5. What are clinico-morphological manifestations of hypertensive disease?
6. Name the morphological changes in arterioles in hypertensive disease.
7. Characterize the morphology of acute and chronic (secondary) changes in the organs in hypertensive disease?

### **Terminology**

Essential hypertension, vasoconstriction hypertension, benign hypertension, malignant hypertension, hypertensive crisis, hemorrhagic insult, ischemic insult, granular kidney, arteriolonecrosis, arteriolosclerosis, azotemic uremia.

### **Practical habits and skills:**

The students are to be able to differentiate symptomatic hypertension and hypertensive disease on the base of clinico-morphological signs; to define all types of hypertensive disease, to estimate the significance of complications and outcomes of different forms of hypertensive disease.

### **Revise the word-building elements:**

- hyper – increased
- lipo – fat
- teno – pressure
- tropho – nourishment
- myo – muscle
- cardio – heart
- nephro – kidney
- thrombo – blood clot
- athero – plague
- ischo – hold back
  
- sion – condition
- ia – condition
- osis – disease
- sclerosis – hardening
- oma – tumor
- stenosis – tightening

### **Lesson**

#### **Subject: Systemic diseases of connective tissue with immune disturbances (rheumatic, collagen diseases)**

**Validation of the subject:** the knowledge of pathological anatomy of rheumatic diseases and their clinico-anatomical forms is necessary to study the diseases of cardiovascular system in clinical departments as well as in practical activity of the physician.

**Objectives of the lesson:** to study the etiology, pathogenesis, pathological anatomy, outcomes, complications of rheumatic diseases, to know their

classification; to learn to distinguish them, to know the morphological characteristic of each disease. During the lesson it is necessary to give definition of rheumatic diseases, to name characteristic changes in the connective tissue in these diseases, to be able to diagnose the forms of rheumatic endo-, myo-, pericarditis, to diagnose pseudorheumatism, systemic lupus erythematosus, to explain the causes of death.

### **Visual aids**

#### *Annotated tables:*

- classification of rheumatic endocarditis;
- systemic lupus erythematosus;
- visceral signs of rheumatic disease.

#### *Coloured tables:*

- Aschoff-Talalayev granuloma.

#### *Slides:*

- acute verrucous endocarditis;
- productive nodular myocarditis;
- skin in systemic lupus erythematosus;
- glomerulonephritis in lupus erythematosus;
- "nutmeg" liver;
- brown induration of the lungs.

#### *Macrospecimens:*

- acute verrucous endocarditis;
- recurrent verrucous endocarditis;
- fibroplastic endocarditis;
- concentric hypertrophy of the heart;
- stenosis of the ostium of the mitral orifice;
- nutmeg liver;
- brown induration of the lungs;
- fibrinous pericardium;
- glomerulonephritis in lupus erythematosus.

#### *Microspecimens:*

- # 181 – acute verrucous endocarditis;
- # 183 – productive nodular rheumatic myocarditis;
- # 26 – glomerulonephritis in lupus erythematosus;
- # 27 – periarterial sclerosis of the spleen.

#### *Electronogram:*

- immune complexes in the skin in systemic lupus erythematosus;
- glomerulonephritis in lupus erythematosus.

### Questions to control basic knowledge:

1. Is affection of the connective tissue characteristic for rheumatic diseases?
  2. What diseases from the listed below belong to the rheumatic group:  
A. *Atherosclerosis.* E. *Dermatomyositis.*  
B. *Idiopathic hypertension.* F. *Pseudorheumatism.*  
C. *Bekhterev's disease.* G. *Nodular periarteritis.*  
D. *Systemic lupus erythematosus.*
  3. Name the types of endocarditis according to the localization:  
A. *Atrial.* B. *Valvular.* C. *Chordal.* D. *Parietal.* E. *Vascular.*
  4. Name the clinico-anatomical forms of rheumatic disease:  
A. *Acute.* D. *Polyarthritic.* G. *Nodular.*  
B. *Cardiovascular.* E. *Congenital.*  
C. *Chronic.* F. *Cerebral.*
  5. What changes in the heart from the listed below belong to rheumatic disease:  
A. *Myocarditis.* D. *Diffuse interstitial exudative.* G. *Fibrinous.*  
B. *Pericarditis.* E. *Serous.*  
C. *Nodular productive.* F. *Focal interstitial exudative.*
- Answers: 1 – yes, 2 (c, d, e, f, g); 3 (b, c, d); 4 (b, d, f, g); 5 (1 a, b, d), (2 c, e).

### Stages of individual work in class:

#### Study and describe macrospecimens:

1. *Acute verrucous endocarditis.*

Describe the cusps of the mitral valve; the appearance, size of the plaques on the surface of the valve, their colour; characterize the condition of the myocardium, the outcome of these plaques on the cusps of the valve.

2. *Recurrent verrucous endocarditis.*

The appearance of thickened cusps of the valve (pay attention to the short and thickened tendinous strings). Describe the appearance of the thrombotic masses, the condition of the myocardium.

3. *Fibroplastic endocarditis.*

Characterize the cusps of the aortic valve and the mitral valve cusps, their colour, transparency, thickness, condition of the cavity of the left ventricle.

4. *Stenosis of the ostium of the mitral orifice.*

Describe the cusps of the mitral valve, their thickness, colour; the appearance and width of the opening. Due to what process did stenosis develop in the valve? Describe the condition of the myocardium of the left ventricle, its colour. The size, type of hypertrophy.

5. *Fibrinous pericardium (Cor villosum).*

The appearance of the heart, changes of the pericardium. What does the heart look like? Name the types of pericarditis in rheumatic disease and their outcome.

6. *Glomerulonephritis in lupus erythematosus.*

Describe the appearance of the kidney, condition of the incision.

To study the other microspecimens it is necessary to use the manuals devoted to the subjects: "The mixed degeneration" and "Disturbance of blood circulation".

**Study, describe and draw microspecimens:**

– # 181 – *acute verrucous endocarditis* (stained with hematoxylin and eosin).

Pay attention to fibrinoid swelling of the cusps, verrucous plaques on them, focal lymphocytic-histiocytic infiltration on the surface of the valve. Possible outcomes of verrucous plaques on the valve.

– # 183 – *rheumatic productive nodular myocarditis* (stained with hematoxylin and eosin).

Name the organ, find Aschoff-Talalayev granuloma. Of what cells does it consist? Where does it appear more often? What types of rheumatic nodules-granulomas are distinguished?

– # 26 – *glomerulonephritis in lupus erythematosus* (stained with hematoxylin and eosin).

Pay attention to the thickening of capillary membrane in the glomeruli with "wire loop" formation. Find hematoxylin bodies. Name the outcomes.

– # 27 – *periarterial sclerosis in the spleen* (stained with hematoxylin and eosin).

Pay attention to the growth of connective tissue surrounding the artery, which looks like onion skin.

**Study the electronograms:**

*Immune complexes in the skin in systemic lupus erythematosus.* Pay attention to focal thickening of basal membranes of the arterioles, accumulation of immune complexes.

*Glomerulonephritis in lupus erythematosus* - accumulation of immune complexes under the endothelium of the glomerular capillaries, podocytes and in mesangium.

**Krok questions:**

1. A 45-year-old female, who complained of progressing muscular weakness, underwent a biopsy of soft tissues on her shin. A histological examination of the biopsy revealed some microfocal petrification of the derma and skeletal muscles, a reduced amount of glycogen and transversal striation in the muscular fibres, some fibres were necrotized, the stroma was infiltrated by lymphocytes, macrophages and plasma cells. Make a diagnosis of the disease.

A. *Dermatomyositis*.\*

D. *Rheumatism*.

B. *Systemic scleroderma*.

E. *Polyarteritis nodosa*.

C. *Systemic lupus erythematosus*.

2. A 54-year-old female suffers from an expressed deformity of joints of her fingers and toes. Histologically, the periarticular connective tissue reveals some

muroid swelling, foci of fibrinoid necrosis, clusters of macrophages and areas of sclerosis, the synovial membrane has an oedema of villi, as well as their muroid and fibrinoid swelling, the synovial cavity contains "rice bodies ". Make a diagnosis of the disease.

A. *Rheumatoid arthritis*.\*

B. *Rheumatism*.

C. *Bekhterev's disease*.

D. *Infectious polyarthritis*.

E. *Gout*.

3. The 7-year-old child died from progressing rheumatism with the expressed allergic reactions. In autopsy edemic mitral valve, histologically is fibrinous swelling. Hyperemia of myocardium, diffuse infiltration by lymphocytes takes place. Pericardium is thickened, grayish color. The described changes in heart it is possible estimate as:

A. *Pancarditis*.\*

B. *Endocarditis*.

C. *Myocarditis*.

D. *Pericarditis*.

E. *Cardiosclerosis*.

### Questions to control the knowledge:

1. What diseases are considered rheumatic ones?
2. Name the phases of disorganization of the connective tissue in rheumatic diseases.
3. What types of rheumocarditis are distinguished according to the localization of the process?
4. Name the types of rheumatic endocarditis.
5. Name the forms of myocardites in rheumatic disease.
6. List the types of pericardites.
7. The features of rheumatic diseases in children.
8. Clinico-anatomical forms of rheumatic disease.
9. Complications of rheumatic diseases and causes of death.
10. Pathological anatomy and causes of death in rheumatoid arthritis.
11. Pathology and outcome of systemic lupus erythematosus.

### Terminology

Endocarditis (valvular, chordal, parietal), simple (valvulitis), acute verrucous, recurrent verrucous, fibroplastic, myocarditis (exudative, productive), pericarditis, "cor villosum", "cor bovinum", compensated and decompensated defect of the heart, Aschoff-Talalayev granuloma, pancarditis, endotheliosis, hysterical chorea, ankylosis, rice body, Bekhterev's disease, pseudorheumatism, rheumatic disease, systemic lupus erythematosus, scleroderma, nodular periarteritis, dermatomyositis, Sjogren's syndrome, hematoxylin bodies, onion-like sclerosis, lupus nephritis, "wire loops".

### **Practical habits and skills:**

The students are to be able to diagnose rheumatic diseases and their complications on the basis of morphological changes.

### **Revise the word-building elements:**

endo – inside  
peri – surrounding  
pan – whole  
pseudo – false  
granulo – granular, grainy  
cardio – heart  
valvulo – valve  
myo – muscle  
myoso – muscle  
sclero – hardening  
arterio – artery  
dermato – skin  
nephro – kidney  
steno – narrowing  
-oid – resembling  
-itis – inflammation  
-oma – tumor  
-osis – disease  
-ous – pertaining to

*Навчальне видання*

**ХВОРОБИ СИСТЕМИ КРОВІ. АТЕРОСКЛЕРОЗ  
ТА ШЕМІЧНА ХВОРОБА СЕРЦЯ.  
ГІПЕРТОНІЧНА ХВОРОБА.  
РЕВМАТИЧНІ ХВОРОБИ**

***Методичні вказівки до занять з патоморфології  
для студентів медичних вузів  
з англійською мовою навчання***

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WITH IMMUNE DISTURBANCES**

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